Attitudes towards Cognitive Enhancement in Switzerland - An Empirical Ethical Approach

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Dissertation

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Summary

Whilst cognitive enhancement was present in literature of the general public as well as in research as I commenced my Ph.D. in 2010, there was not an abundance of data relating to the use of such cognitive enhancers (CE). The authors of the memorandum on cognitive enhancement in 'Gehirn & Geist', a journal for the general public, mentioned in November 2009 an absence of surveys [1]. Such data could be seen as fostering the debate in society and are in line with the requests of Forlini and Racine after conducting an analysis of English newspaper articels about the non-medical use of Ritalin®[2]. Until then, no data regarding the use of CE concerning Switzerland existed, with only one survey published in Germany in February of 2009 [3].
The goal of my Ph.D. was to evaluate data regarding the attitudes and handling of CE in Switzerland. I developed and evaluated an online survey among students of the University of Zurich (Chapter 2). I received completed questionnaires from 1765 students and compared the answers of users and non-users with a focus on their characteristics and attitudes. In order to evaluate the attitudes of physicians, a paper-and-pencil survey was developed by others whereas I conducted the pre-tests and the survey and evaluated the data (Chapter 3). From the pre-defined sample of 1600 Swiss practicing physicians, 379 physicians completed the questionnaire (response rate 24.7%), which addressed their familiarities with requests for CE and their willingness to prescribe such products.
With these data I want to contribute to an evidence based policy debate in Switzerland. Furthermore, I assume that such data will lead to a more balanced media presentation of CE usage and a better-informed public debate. Instead of contributing to what has been called a media hype [4], the data from the students could help to understand why some students are taking CE and others not, as well as where they obtain it from. On the other hand, knowledge of how often physicians in Switzerland received requests for such CE and how they deal with it will give another perspective on the prevalence of the usage of CE in Switzerland. Both questionnaires contained questions relating to ethical aspects of CE. An additional project within my Ph.D. was more theoretical in nature and was designed to critically investigate the claim that increased productivity is a benefit of cognitive enhancers (Chapter 5).
In summary, this work provides insights into the attitudes of students as well as physicians in Switzerland when it comes to the usage of cognitive enhancement, including ethical aspects of such usage. Moreover, there was also an additional focus on the desire for increased work productivity in the discussion regarding cognitive enhancement.

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1 Introduction

1.1 Cognitive Enhancement

Cognitive enhancement is a well-known field in bioethics. Indeed, different definitions exist when it comes to this term, one of which is provided in a frequently cited paper by Greely et al., where cognitive enhancement is described as the usage of medications to treat psychiatric and neurological conditions for improving the performance of a healthy person [5]. I will use this definition in the following work, but will add 'for improving *directly* the *cognitive* performance of a healthy person'. The term 'directly' was added for excluding products that e.g. calm down and therefore indirectly enhance cognition. Improving cognitive performance stands for the improvement of the short- and long-term memory as well as effects on the executive functioning [6]. The latter stands for 'a cognitive system that controls and manages other cognitive processes and is involved in planning, cognitive flexibility, abstract thinking and inhibiting inappropriate actions' [6]. Taken together, my definition of cognitive enhancement is the following: The usage of medications used to treat psychiatric and neurological conditions with a view to directly improving cognitive performance and in turn improving short- and long-term memory as well as effects on the executive functioning of a healthy person.

Another common term often used in place of 'cognitive enhancement' is 'neuro - enhancement'. In this work, I will only utilise the term 'cognitive enhancement' due to the fact that 'cognition' is a narrower term than the word 'neuro'; the latter of which stands for anything concerning nerves including cognitive and mood enhancement. The reason behind my preference of such a narrow term will be explained in the following sections on cognitive enhancers.

A search for publications on the topic of 'cognitive enhancement', yielded 8998 papers. These were found on 'web of knowledge' based on Web of Science®, BIOSIS Previews®, MEDLINE®, Zoological Record®and Journal Citation Reports®[7]. With regard to the topics 'cognitive enhancement' and 'ethics', 111 publications appeared with a maximum in 2009 of 18 publications and a range from 1992-2013. This data shows that there is an active and on-going discussion in the academic field concerning the topic of cognitive enhancement.

Publications around cognitive enhancement are not at all restricted to the academic field. A basic search in the German and English press revealed 1195 publications starting from 2003 until today (Search terms were: braindoping, 'hirndoping', neuroenhancement or cognitive enhancement; database LexisNexis, 14. August 2013). Such publications

in the media were analysed by Partridge et al. The authors analysed English print newspaper articles from 1st January 2008. to 31st December 2010 and concluded that the possible benefits of using drugs for cognitive enhancement are more often mentioned in the 142 analysed articles than the potential risk and side effects. In addition, the main source of these articles, which claim that cognitive enhancement is common and widespread, provides a weak support for such statements [4]. The authors asked journalists as well as researchers for caution concerning the presentation of the non-medical use of drugs for cognitive enhancement. The data of Partridge et al. were in line with previous analyses of English newspaper articles concerning the non-medical use of Ritalin®from 1st January 2000 - 14th November 2006 [2]. The authors concluded that the beneficial effects of Ritalin®were generally portrayed enthusiastically, although there was far from an abundance of information regarding associated risks. The authors also analysed the ethical and social issues presented in the media. They concluded that even though some arguments were mentioned in the media, it is important to foster better informed public debates [2].

1.2 Cognitive Enhancers

Exactly what constitutes a cognitive enhancer differs in the literature. Such an existence of different definitions can also be observed in the surveys regarding the use of CE where various reference products were included (see section 1.6 on 'state of research'). Förstl defined CE as, among others tea, red wine and sugar [8]. However, the definitions are, for the most part, narrower than this. Lieb defined CE as the misuse of drugs, which were developed as treatments for specific illnesses and which were only available on prescription [9, p. 21]. Such a definition excludes luxury food like chocolate, caffeine, nicotine as well as drugs such as cocaine, which have not been developed as treatments against an illness. Drugs included in this definition were Ritalin®, Adderall®, modafinil, antidementia drugs and antidepressants.

In the two surveys conducted for my Ph.D., I used a rather narrow definition in order to ensure that the participants had the same or very similar products in mind while answering the questions. This helps to make the answers comparable. For the survey among students, I used the definition: 'Products for increasing your concentration and/or alertness as a healthy person' and included the products Ritalin®, Adderall®and Modasomil®. Additionally, I included a list of products for Ritalin®called Concerta®, Daytrana®, Metadate®, Equasym®and Medikinet®whilst for Modasomil®, I included the products Provigil®, Vigil®and modafinil (fore more information Section '2.2 Publication'). The main reasons behind this selection were that these three products have been declared as the most common CE [e.g. 5] and are also used as reference products in other empirical surveys. For the survey among physicians, a definition of 'neuroenhancement' was given, including the products methylphenidate (Ritalin®), modafinil (Modasomil®), antidepressants and antidementia drugs. I will now present a short overview of the most common CE, namely Ritalin®, Adderall®and modafinil.

1.2.1 Ritalin®and Adderall®

Ritalin®(methylphenidate) and Adderall®(mixed amphetamine salts) are drugs which were developed for the treatment of attention deficit hyperactivity disorder (ADHD) [5]. Methylphenidate and amphetamines increase the level of the neurotransmitters noradrenaline and dopamine, both of which are involved in controlling alertness, concentration and attention [9, p. 66]. Methylphenidate increases the levels of these neurotransmitters by blocking the receptor for a reuptake into the cell. As a result, Ritalin®can only lead to increased concentration of these neurotransmitters if the cells are already in an activated state having released neurotransmitters. On the contrary, amphetamines can also increase neurotransmitter concentration if the cells are in an inactive state. One assumes that amphetamines directly increase the release of the neurotransmitters noradrenaline and dopamine whilst also blocking the receptors which play an important role in carrying information regarding the release of neurotransmitters back to the cell [9, p. 72]. Structurally related with amphetamines are the addictive drugs 'Ice' and Cristalmeth'. These drugs consist of metamphetamine, which is essentially D-amphetamine with an additional methyle-group [9, p. 66]. Another structurally related drug is 'ecstasy' (methylendioxy-metamphetamine=MDMA).

In ADHD patients, Ritalin®and Adderall®lead to a decrease in hyperactivity, inattention and impulsivity [10]. Reports about healthy people taking Ritalin®are documented in different Swiss and other countries newspapers and magazines (e.g. 'Das Magazin', 2009; 'The New Yorker', 2009; 'Time', 2009; 'NZZ Folio', 2010; 'The New York Times', 2012 [11, 12, 13, 14, 15]. Indeed, people who conducted self-experiments reported increased energy levels and concentration. Some reports also mentioned side effects including, among others, sleep problems.

Studies about the effectiveness of methylphenidate in healthy people were analysed by Repantis et al. [16]. They analysed 19 publications, which were chosen due to the methodological approach (on healthy probands and randomised control trials) and the relevance of the results. The authors concluded that Ritalin®had a significant positive effect on memory. No consistent evidence was found for attention, mood and executive functions. With regard to wakefulness, it was not possible to perform any statistical analysis due to the lack of baseline measurements in these studies (meaning that the effect of CE was only compared with the effects of the placebo). The effect on memory was seen in single dose studies. Indeed, there was an insufficient number of studies with repeated drug doses, thus meaning that statistical analyses could not be conducted. Studies examining effects on sleep-deprived probands were analysed but not comparable. One of these studies concluded a negative effect on the self-reporting, with people rating their performance better than it actually was [16]. These results from the meta-analysis of Repanits et al. were in line with the conclusion drawn from a previous meta-analysis of the empirical evidence of Ritalin®as a CE [17]. The author of that meta-analysis concluded that neither drug efficacy nor the benefit-to-risk balance provided evidence that Ritalin®is a suitable CE.

A very common side effect Ritalin®in healthy people was increased heart rate, which was reported in 13 of 14 analysed studies reporting side effects [18]. An increase in blood

pressure was not consistently found. Other reported side effects were headache, anxiety, nervousness, dizziness, drowsiness and insomnia [18]. Taken together, Ritalin®has an effect on memory, although until know no effects on e.g. wakefulness and attention could be proven in a meta analysis of studies in healthy people, even though such effects were described in self-experiments.

With regard to Adderall®, no meta studies exist to the best of my knowledge. Ilieva et al. conducted a powered double-blind cross-over placebo controlled trial on a standard dose of Adderall®among a sample of 24 female and 22 male probands all of whom were healthy and young (age 21-30) [19]. The authors concluded that Adderall®had no medium or high effect on any of the 13 measures for cognition ability including memory, inhibitory control, convergent creativity, intelligence and scholastic achievement. Some small effects were found for tests relating to word recall, convergent creativity and non-verbal intelligence among lower ability participants. Another finding was that the users may perceive the drug as enhancing their cognition [19].

Following a much smaller meta-analysis of twelve studies, of which six studies where about Ritalin®and six about amphetamines like Adderall®, Lieb concludes that these substances increase attention in healthy probands and decrease reaction time. He also reported that studies on sleep-deprived probands with amphetamines showed increase effects on reaction time [9]. Observed side effects in each of these six studies are summarised in another paper [20]. For Ritalin®and amphetamines, observed side effects in healthy probands included tachicardia, hypertonia, uneasiness and concentration difficulties (>10% of the probands reported them). More than 1% of them mentioned headaches, dizziness, gastrointestinal problems and others. The authors stated that a risk of addiction exists, although it would be higher if the substance was injected or sniffed [20].

Interestingly, these effects of Ritalin®and amphetamines shown in studies on healthy probands are lower than the reported effects in self-experiments. Possible explanations are forwarded by Eckhardt et al., who propose that the situation under laboratory conditions cannot equate to real-life situations. Additionally, the placebo effect could have led to a subjective over-estimation of the effects [21]. Irena Ilieva and colleagues conducted a closer examination of this discrepancy after concluding in their study that the cognitive benefits of Adderall®are only modest [19]. The authors came up with three possible suggestions: 1) that users may have a small cognitive advantage which is useful, 2) that individual differences may lead to sizable cognitive advantages for some users, or, the focus of their paper, 3) that users may gain a non-cognitive advantage which helps them to perform better in school or on the job [22]. Such a non-cognitive advantage would be motivational instead of purely cognitive.

An analysis of data from a Swiss insurance Helsana-group revealed that the purchase of methylphenidate as well as the amount increased continuously over the years spanning 2006 to 2009 [23]. In 2006, 3300 of 20'000 insured people received methylphenidate (=0.26%), which increased to 5100 of 28'900 in 2009 (=0.37%). In 30% of cases these people received methylphenidate from a physician whilst in 70% of cases they sourced it from a pharmacy or on prescription [23].

In summary, an effect on memory in healthy people could be proven for Ritalin®and ambiguous data exists concerning effects on attention [16, 9]. It was found that Adderall® could have some small effects for tests regarding word recall, convergent creativity and nonverbal intelligence among lower ability participants [19].

1.2.2 Modafinil

The third CE one often referred to in the literature is modafinil. Brand names of this psychotropic drug include Provigil®and Nuvigil®in the US, Vigil®in Germany and Modasomil®in Switzerland and Austria. Modafinil was developed for the treatment of exhaustion caused by narcolepsy, sleep apnoea or sleep disorders due to shift work [5]. Indeed, Provigil®, manufactured by the company 'Cephalon' passed the one billion US-dollar mark in 2008. That was the year when the 'Food and Drug Administration' (FDA) imposed a fine on 'Cephalon' of 425 million US dollars. The FDA called 'Cephalon' to account for advertising Provigil and other drugs outside the approved usage [24]. The chief motive for using modafinil outside the approved usage is the overcoming of exhaustion and jetlag [25].

Whilst the mechanism behind the effect of modafinil is not yet fully understood, it could be shown that modafinil has direct and indirect effects on various neurotransmitter-systems [10]. In more detail, interferences of modafinil with the neurotransmitters hypocretin, histamine, gamma-aminobutyric acid (GABA), glutamate and norepinephrine have been found [26]. Modafinil is involved in modulating orexin, which regulates wakefulness and blocks a dopamine transporter leading to increased dopamine levels [26].

Minzenberg and Carter accomplished a meta analysis in 2008. The authors concluded that there is increasing evidence that modafinil can improve cognitive functions like working and episodic memory [27]. Furthermore, they wrote that modafinil increases alertness and decreases feelings of exhaustion. In their publication on methylphenidate, Repantis et al. also investigated surveys relating to modafinil [16]. They analysed 31 publications, which where equivalent to the selection of studies on methylphenidate chosen by the methodological approach (on healthy probands and randomised control trials) and the relevance of the results. They concluded that modafinil improves attention for well-rested people. For such well-rested individuals, the positive effects on wakefulness, memory and executive functions were significantly higher than when placebo was given. However, repeated doses of modafinil could not prevent the negative effect of a longer period of sleep deprivation on cognitive performance, even though maintaining wakefulness and possibly even leading to overconfidence concerning ones own cognitive performance [16].

These effects are of significant interest to the army. According to publications released by the Defence Medical Supplies Agency, the British army has bought more than 24'000 tablets of Provigil since 1998 [28]. No recent data on this topic was found.

Side effects of modafinil included primarily headaches, dizziness, gastrointestinal complaints (e.g. nausea, abdominal pain, dry mouth), increased diuresis, palpitations, nervousness, restlessness, sleep disturbances and insomnia, the latter of which was particularly common in studies with non-sleep deprived individuals [16]. In their paper,

Esposito et al. summarised that modafinil might lead to fewer side effects compared to other drugs such as amphetamines and methylphenidate. Modafinil also has an advantage over the likes of methylphenidate with regard to addiction. Indeed, the latter is unstable when heated and can therefore not be injected intravenously [29]. However, Roberto Esposito and his colleagues also highlighted that this assumption concerning side effects could be false due to recent findings which prove the strong effect had by modafinil on the dopaminergic system [26]. Why this could be is explained in the next section.

In general, some researchers have claimed that CE have similar effects to those of coffee e.g [9]. However, this has been refuted by Andreas Heinz and his colleagues [29]. Unlike psychostimulants and other drugs, coffee maintains a dopamine release in the prefrontal cortex but not in the ventral striatum. Modafinil on the other hand leads to a release of dopamine in the ventral striatum, which is a core area of the reward system. Indeed, modern addiction theories see the dopaminergic neurotransmitter system as playing a key role [29]. All of the known substances with addiction potential lead to an increase of dopamine in the so-called reward system [29]. Drugs such as amphetamine, cocaine, methylphenidate and modafinil maintain a release of dopamine of approximately 175% to 1000%, where the references are triggers of the dopamine release by food, sex and human communication of around 50% to 100% [29]. Next to the differences pertaining to the number of triggered releases of dopamine exist differences concerning habituation. Repeated environmental stimuli lead rapidly to habituation. In contrast, drug usage leads consistently to an increase in the release of dopamine. This results in a counter-regulatory neuroadaptive process like e.g. the reduction of dopamine receptors. Therefore, repeated drug use, which leads to a reduction in response after environmental stimuli, maintains an increase in the desire for further drug consumption and away from goal-directed behaviour like 'food, sex or communication' [29]. CE, which should per definition modulate learning and memory performance, necessarily affect dopamine neurotransmitters due to the fact that basic learning mechanisms are driven by reward and punishment and therefore by the reward system [29]. Additionally, the dopamine function in the ventral striatum is directly linked to the fluid IQ about problem solving and flexible behaviour adjustment [29]. Due to these aspects, the authors doubt that there will ever be a CE which has effects on memory and learning without the potential for addiction.

1.2.3 Further CE

Other groups of CE, which are mentioned in literature next to methylphenidate, amphetamines and modafinil, include antidementia drugs and antidepressants [e.g. 9]. For each of these two classes of drugs I will present a short overview regarding their possible effects as CE and observed side effects.

A meta review on the effects of antidementia drugs, e.g. the acetylcholinesterase inhibitors (the substances donepezil, galantamine and rivastigmine) and memantine was conducted [16]. The analysis of 20 studies revealed that the current research neither supports nor opposes the use of antidementia drugs as CE. These drugs were well tolerated

in most of the trials. Observed side effects for acetylcholinesterase inhibitors in these studies were benign and lead only in a few cases of dropouts. Such side effects included mainly gastrointestinal complaints as well as headaches, dizziness, nightmare and insomnia. The studies included in this review on memantine did not mention side effects with the exception of one study mentioning drowsiness. With regard to memantine, Lieb mentioned side effects of increased blood pressure, headaches, dizziness, sleepiness and constipation, which were very common (>10%) or common (1-10%) [9]. However, due to the fact that the authors cited the Medicines Compendium, these side effects are most probably only seen in sick people using memantine for a treatment [9, 20, p. 78]. In most of the analysed studies of the meta review the drugs were well tolerated [16]. Benign side effects were observed in the repeated trials of acetylcholinesterase inhibitors including gastrointestinal complaints as well as headaches, dizziness, somnolence, nightmares and insomnia [16].

A systematic review and analysis of the effects of antidepressants (in detail the substances paroxetine, citalopram, reboxetine, fluoxetine, sertraline, fluvoxamine, moclobemide, bupropion, venlafaxine, escitalopram and duloxetine) as a CE as well as a emotional enhancer was conducted by Dimitris Repantis and colleagues [30]. The conclusion was very similar to that pertaining to antidementia drugs: The 65 included studies did not provide evidence for or against any effect in healthy people. The authors even concluded that these studies were inept when it came to answering this question, most likely because most of them were not designed to answer questions regarding CE. Side effects reported in the analysed papers of that systematic review were mostly benign. They were usually observed after the initial administration and normally wore off with continued intake [30]. The most common side effects included gastrointestinal complaints, sleep disturbance, restlessness, tremor, headache, dizziness, fatigue and drowsiness [30].

Taken together, the studies relating to antidementia drugs and antidepressants do not provide evidence for or against any effect in healthy people.

1.2.4 Non-Pharmaceutical Products and Methods

Such non-pharmacological products and methods would not be included in the definition above of CE nor in the definition about cognitive enhancement. The most commonly used definition of cognitive enhancement specifies that it must be a medication. However, broader definitions of CE do include such non-pharmacological products and methods. I will discuss here the products coffee, energy drinks, sugar and nicotine as well as the methods physical exercise, sleep, meditation, mnemomic strategies, computer training, brain stimulation and possible further products [18, 20]. This selection is not seen as exclusive for non-pharmaceutical products and methods as CE but includes the main products and methods mentioned in the literature.

Caffeine is an adenosine receptor antagonist and reduces inhibition of neural firing [18]. Effects include elevated mood, increased alertness and better attention. Caffeine tolerance can occur most likely in heavy coffee drinkers. Withdrawal of caffeine can lead to headaches, increased subjectively perceived stress and reduced alertness and fatigue. However, these withdrawal effects are manly caused by psychological rather

than pharmacological factors [18]. Energy drinks are another source of caffeine and it has been suggested that such drinks enhance physical and cognitive performance [31]. These drinks contain 40-250mg of caffeine (a cup of coffee contains around 40-120mg [21]), and often also taurine, guaranà, ginseng, glucuronolactone, B-vitamins, and other compounds [31]. A literature search on Pubmed, Psych Info and Google Scholar led the authors to the conclusion that there is an overwhelming lack of evidence that the other components of energy drinks other than caffeine and, to a lesser degree, glucose and guaranà, have any enhancement effect [31]. Another suggestion is that the effects of energy drinks are based on the combination of caffeine with sugar [21].

Sugar improves attention, response speed and working memory. Specifically, the most noticeable effects were found on the declarative memory [18]. A systematic review of the effects of chocolate on cognitive function and mood included 10 studies [32]. The analysis revealed that five out of eight studies on effects on mood showed a positive effect on mood state or an attenuation of negative mood. Three out of eight studies concerning effects on cognitive function showed clear evidence for cognitive enhancement by the chocolate components cocoa flavanols and methylxantines such as caffeine and theobromine. Taken together, the positive effects of having a coffee and a chocolate bar when feeling tired and/or unfocussed has been proven by many studies. Another option would be to go for a run, have a nap or smoke a cigarette.

Physical activity has beneficial effects on brain function and cognition, whilst sleep enhances cognitive capacities, specifically memory and creativity [18]. Many anecdotal reports exist on this subject, e.g. Friedrich August Kekulé who claimed that he discovered the ring shape of the benzene molecule after having dreamt of a snake seizing its own tail [33]. Studies could replicate such enhancing effects of sleep on creativity [18]. The effects of nicotine have been investigated in many studies [34]. Positive effects on attention, working memory and complex task performance have been found in satiated smokers as well as in non-smokers [34]. However, many people are aware of the severe side effects of smoking, which could even increase since the EU parliament decided recently to increase the warning notices and include pictures of side effects on the packages of cigarettes.

Meditation should be practiced for a while if it is to improved sustained attention abilities. However, even if one is a beginner, positive effects were seen on attention [18]. A recent meta analysis found that the strongest effects related to changes in emotionality and relationship issues, as well as medium effects on attention and smaller effects on memory and other cognitive capacities [35].

Mnemonics is seen as denoting internal cognitive strategies with the goal of enhancing memory [18]. A famous example is the method of loci, which was performed by the ancient Greek and Roman orator. Information items are visualised at salient points along a route, which is then mentally walked through in order to retrieve the information [18]. The more complex the memorised information, the stronger the effects of such methods.

Games and computerised training are promising methods when it comes to cognitive enhancement. Effects on processing speed and perception were observed as were smaller effects on different memory domains [18].

Electrical brain stimulation can be non-invasive, including transcranial direct current stimulation (tDCS) and transcranical magnetic stimulation (TMS) or invasive, including deep brain stimulation (DBS) or direct vagus nerve stimulation (dVNS). These four techniques use electrical impulses to make neurons either less excitable by hyperpolarisation or more excitable by depolarisation [18]. The results of various studies lead to the assumption that tDCS, TMS and dVNS can enhance the memory encoding. DBS on the other hand can directly affect the modulation of memory systems [18].

Possible further products for enhancing memory CE could target the specific and until now not completely understood mechanism underlying memory formation. The goal would be to enhance neuroplasticity by targeting glutamate receptors for the induction of long-term potentiation or to increase the amount of CREB, a protein which strengthens the synapses and is thus involved in long-term memory consolidation [6]. Such products would be ampakines modulating glutamate receptors or the CREB activators. It has been shown that the enhancement of CREB function leads, in some regions of the brain, to positive effects on memory, anxiety and depression. However, in other brain areas it has had opposite effects, such as increasing fear, anxiety, depression as well as drug addiction [6].

Taken together, various products and methods can improve the cognitive performance of healthy people. Whilst these products and methods are not included in the definition of cognitive enhancement provided in Section 1.1, which focusses on medications used to treat psychiatric and neurological conditions, they are included in wider definitions of this term.

1.2.5 Products for other Enhancements

The authors of the TA-Swiss report (Centre for Technology Assessment) have differentiated between cognitive and emotional enhancement [21]. Emotional enhancement is defined as products for coping with stress [21]. This group consists of antidepressants, betablockers, sleeping pills and suppressants, oxytocin and illicit drugs such as ecstasy and cocaine. The term 'directly' was used in the definition of CE for excluding these products above. Most of these products will indirectly influence the cognitive performance by reducing the feeling of stress.

Another term, and one used more often in the literature is mood enhancement (ME) [e.g. 6]. However, such a distinction between CE and ME is not as sharp as it seems here, where products could lead to e.g. an increase in spirit as well as alertness and to a better attention. I will now provide a more detailed explanation of the possible effects of mood enhancers including antidepressants, betablockers, sleeping pills and suppressants, oxytocin and illicit drugs like ecstasy and cocaine.

As mentioned above, Repantis et al. concluded that there are is scientific evidence relating to the cognitive or mood enhancing effect of antidepressants in healthy people [30].

Betablockers are a drug used to tackle irregular heart rate and anxiety states [36]. The off-labelled usage of this drug is against stage fright or generally in acute stress situations [21]. Clinical evidence does exist regarding the positive effects of small doses

of betablockers on stage fright [37]. Another field in which betablockers could work as ME is in the inhibition or eradication of non-conscious negative emotional memories [38]. Betablockers could work as a treatment against post-traumatic stress disorder (PTSD) but also as a ME e.g. shortly after or even before (e.g. to soldiers) a most probably traumatic situation [38].

Sleeping pills and suppressants are anxiolytic, sleep-inducing, calmative and muscle relaxing [21]. Such pills could again be used indirectly as CE in order to cope better with pressure [21].

The neuropeptide oxytocin mediates pro-social behaviour such as pair bonding and maternal care, although more research is needed in order to understand the effects of oxytocin on human social behaviour [6]. Whilst I will not go into details regarding the illicit drugs, one major and obvious point is that they have a high addiction potential.

Other products mentioned by the authors of the TA-Swiss report as enhancers against stress are Adaptogenes like Ginkgo biloba as well as alcohol. Gingko biloba is used by healthy people to tackle cognitive decline related to age [39] even though no clinical evidence has been found for such effects, independent of a single dose or repeated usage [39]. Alcohol is not a good CE at all, and leads to impairments in psychomotor and cognitive tasks e.g. slowing reaction times, impairing memory formation and increasing errors [40]. With this said however, it can be used as a EC [21]. This could lead to an elevated mood and an anxiolytic effect [21]. On the other hand, the consumption of ethanol could lead to riskier behaviour whereby people may overestimate their ability and act more on short-term consequences than long-term consequences [40].

The aforementioned products, which could be used for other forms of enhancement are not included in the definition of cognitive enhancement given in Section 1.1. Indeed, I focus in the surveys on products which directly improve the cognitive performance in healthy people, with a view to improving the short- and long-term memory as well as effects on executive functions such as planning, cognitive flexibility and abstract thinking. However, even when focussing only on products to enhance cognitive functions it is important to ask what exactly we want to enhance, as I will do in the following section.

1.3 What Do We Want to Enhance

The pharmaceuticals which have an effect on CE are Ritalin®, Adderall®and Modafinil. These drugs, as well as other non-pharmaceutical products and methods with an effect on cognitive performance, are listed in table 1.1. The products which serve other enhancement purposes were not included, with a focus instead placed on cognitive enhancement.

The effects differ considerably when it comes to the functions which the substances enhance (Table 1.1). Thus, the question is; what do these substances enhance? As mentioned at the beginning of this chapter when defining cognitive enhancement, De Jongh et al. define cognition in relation to CE as the following: The improvement of the short- and long-term memory as well as effects on the executive functioning [6]. The latter represents “a cognitive system that controls and manages other cognitive processes and is

Table 1.1.: Substances with an effect on cognitive performance.

Substance	Positive effects
Ritalin®	Memory, perhaps: Concentration, mood and executive functions
Adderall®	Word recall, convergent creativity, nonverbal intelligence
Modafinil	Working and episodic memory, increase alertness, improves attention
Caffeine	Mood, alertness, attention
Sugar	Attention, response speed, working and declarative memory
Nicotine	Attention, working memory, complex task performance
Physical activity	Brain function, cognition
Sleep	Memory, creativity
Meditation	Attention abilities, changes in emotionality and relationship issues
Mnemonics	Declarative memory
Games and computerized training	Perhaps: processing speed and perception, memory
tDCS, TMS, dVNS	Memory encoding
DBS	Modulation of memory systems

involved in planning, cognitive flexibility, abstract thinking and inhibiting inappropriate actions" [6].

When looking at the general term 'enhancement, opposite effects can both be seen as enhancement. An example of this is the formation of memory - where the strengthening of such formation was seen as part of cognitive enhancement and the intake of e.g. betablockers before building traumatic memories as mood enhancement. This is neither ambiguous nor contradictory due to the fact that enhancing performance, which is the broad definition of enhancement [5], can be case-to-case dependent, but in some situations it involves a strengthening and in others a reduction of the memory formation.

Important aspects when talking about the improvement of cognitive performance is to address certain side effects including a decrease in the function of other brain regions. The conclusion that Adderall®can only increase concentration at the expense of decreasing creativity has been disproven [41] and even a small positive effect of Adderall®on convergent creativity has been found [19]. But other side effects could include trade-offs between the enhancement of cognition versus mood. For example, MDMA, alcohol or some antidepressants can lead to cognitive-impairment effects [6]. On the other hand, antidepressants as well as moderate consumption of alcohol lead to indirect positive effects on cognition by reducing anxiety and stress. Reinoud de Jongh and his colleagues concluded that 'the enhancement of mood does not necessarily have to be accompanied by cognitive impairment' [6]. The same is also a true case for the converse situation, meaning that the enhancement of cognition does not have to have negative effects on mood. Following one particular study, it has been suggested that modafinil has general mood-elevating effects but can also increase negative affects such as anxiety [42]. In general, de Jongh et al. concluded that there is no evidence for a trade-off between cognition and mood, but that one does exist between different cognitive domains e.g. long-term memory (LTM) and working memory, consolidation of LTM and modifying

memories, cognitive stability and capacity to flexibly alter behaviour [6].

Taken together, the effects can vary and depend on our understanding of the improvement of cognitive performance. Secondly, no trade off after the usage of CE between cognition and creativity nor cognition and mood was found, although trade-offs concerning different cognitive domains can exist.

1.4 Ethics and Empirical Data

Empirical data can play an important role in ethics. According to Pascal Borry and his colleagues, such data can contribute to each step of ethical reflection: To the description of the moral question, to the assessment of the moral question and to the evaluation of the decision-making [43]. During the first step, which involves a description, empirical data can help to answer the essential 'what, why, how, who, where and when' questions [44]. If these reality-revealing questions are not answered, the risk remains that a judgment is only based on a partial reality [43]. The second step involves an assessment of the moral questions which exists regarding the integration of principles, norms, virtues and values in the specific case, and again, empirical data can help to assess them. The last step is the evaluation; something which is often neglected by the authors. Here empirical data can reveal unforeseen consequences or effects of the decision [43].

The authors highlighted that empirical data can never directly lead to answers regarding the way we ought to be [43]. Such is-ought fallacies is defined by Rob de Vries and Bert Gordijn by referring to David Hume that a set of descriptive premises alone cannot lead to a moral conclusion [45]. Such an is-ought fallacy in the example of cognitive enhancement according to the thee steps of ethical reflection [43] would be the moral conclusion that CE should be allowed: because many students are taking CE (step one); because many students believe that such CE would lead to a better life by leading to more leisure time (step two), or because such products lead to a better life for students by leading to more leisure time (step three). Empirical data can only contribute to ethical clarification and decision processes. Such contribution means that descriptive premises can be part of the set of premises leading to a moral conclusion, if at least one of the premises is not based on empirical findings and therefore normative instead of descriptive [46]. Additionally to the is-ought fallacy, there are two additional fallacies respectively theses called the naturalistic fallacy and the fact-value distinction regarding the use of empirical data in ethics [45]. The naturalistic fallacy goes back to G. E. Moore and stands for the fallacy of identifying the notion 'good' with natural or metaphysical predicates. The fact-value distinction is according to Rob de Vries and Bert Gordijn more a certain meta-ethical view than a fallacy or a problem. Such a fact-value distinction could only than lead to a problem in empirical ethics if it is mandatory to reject the fact-value distinction to engage in this field of ethics [45]. Such a rejection would be needed if it is necessary to claim that at least some statements or concepts are irreducibly both evaluative and descriptive, if it presupposed a realistic analysis of moral discourse or if it necessary assumed that scientific facts presuppose values [45]. The authors conclude that none of these three necessities are presupposed in empirical

ethics and therefore that empirical ethics as a discipline does not have to take sides in this meta-ethical debate [45].

The classical epistemology of moral philosophy focused on how individuals acquiring and justifying reliable moral knowledge. The social epistemology favoured by many feminist and other nonmainstream ethical approaches turn away from such a focus on the individual [47, p. 44f]. Instead on applying a so called 'theoretical-juridical template' by Margaret Urban Walker in moral philosophical analysis [48, p. 7], where the focus is on individuals but also being impersonal, disembodied and rationalist, one has to integrate in the analysis additional data that are used to make moral judgements. According to Margaret U. Walker, moral life is not a project of individuals doing more or less rational choices. Instead, she sees morality as a collaborative social practice through which relationships, responsibilities and commitments are acknowledged and constructed by people [47, p. 46]. In such an 'expressive-collaborative' model moral life is represented as interpersonal and the focus is shifted from action guides to values and practices leading to moral principles [47, p. 46]. Margaret U. Walker is making two points about moral epistemology as summarized by Jackie Leach Scully [47, p. 47]. First, if the social, cultural and economic situation influences the moral judgements of individuals, than it is important that we systematically analyse in ethics what people really do in certain situation and what their reasons for their acts and choices are [47, p. 47]. Secondly, it is important to note that we as researcher are influenced by the situation we are in as well. Any ethical reflection is inescapably along a specific line of sight determined by the identity of the knower. This is even more important because until recently, most people working in moral philosophy were part of a subgroup of being male, well educated, mostly white, from Judeo-Christian cultural backgrounds and mostly not disabled [47, p. 47].

The empirical turn in ethics is based on an increased acceptance of contextuality and greater questioning of the epistemological uniqueness of moral knowledge [47, p. 45]. Empirical ethics is therefore not just a support of normative ethics, but important in itself to understand the ethical actors.

1.5 Ethical Considerations

I will now provide a very brief summary of the ethical considerations in the field of enhancement. Human enhancement and cognitive enhancement constitute elements of a well-discussed field in ethics so I will limit myself presenting the main field of arguments.

The main fields of ethical consideration were put forth by Martha J. Farah and colleagues almost ten years ago [49]. They mentioned four topics, namely safety concerning the tolerable risk when taken by healthy people, the social pressure to enhance, distributive justice when talking about access to CE, and personhood and intangible values, respectively what it means to be a person and the value of achievement [49]. The authors also mentioned ethical issues, which are important for enhancement but which are not restricted to the field like research ethics and 'neurocorrection' in classrooms, prisons and other places [49]. A recent paper addressing arguments in the field of enhancement

listed some additional arguments [50]. One of these arguments pertained to the reduction of valuable human diversity when being able to control how we are along with the lack of imagination regarding how various we could be [51]. Douglas also mentioned the argument first raised by Little in 1998 [52] of undesirable social norms in relation to cosmetic surgeries; an argument later adapted by Schermer to the field of CE. The main premise of the argument is that certain norms may be undesirable, including adapting workers 'to the demands of employers in society' [53]. This argument is discussed in more details in Chapter 5 on cognitive enhancement and productivity.

Conserning these ethical considerations, the high number of people being part in the debate on human enhancement position themselves mostly between the two extreme poles of the so called transhumanists resepectively bioconservatives [e.g. 6]. The transhumanists see enhancement as something good or even as a moral duty [e.g. 54, 55]. In contrast, the bioconservatives fear that, through enhancement technologies, we may lose what it means to be human [e.g. 56, 57].

1.6 State of Research

The present section will provide an overview of the current state of research, with a summary of the quantitative surveys among students and others. The research objective was to evaluate the percentage of users in a sample. The subsections were grouped according to the publications until autumn 2010 when I began my Ph.D. and afterwards until the autumn of 2013. The third subjection (1.6.3) relates to quantitative surveys among physicians, which pertain primarily to their attitudes and handling of CE. The surveys in the following three subsections about the usage of CE are presented in Table 1.2 (p. 21). Table 1.3 (p. 23) contains the surveys about the handling of CE by physicians.

1.6.1 State of Research until 2010

McCabe et al. published the first well-known and broad survey concerning cognitive enhancers [58]. Participants of a pen-and-pencil survey included 10'904 randomly selected students from 119 colleges or universities in 39 US states of in 2001. The analysis of the representative sample (response rate 52%) showed that 6.9% of these participants have had taken Ritalin®and/or Adderall®at least once for nonmedical reasons [58]. The past year prevalence was at 4.1% whilst the past month prevalence was 2.1%. Nonmedical use was higher among students who were male, white, members of fraternities and sororities and those who had lower mark averages. Students who had taken Ritalin®or Adderall®for nonmedical use were also more likely to have consumed alcohol, cigarettes, marijuana, ecstasy and cocaine than non-users. Higher rates for users were found among colleges with increased competitive admission standards [58].

Another survey from this group was completed in 2005 among 4589 college students [59]. Although this online survey was not representative of the US student population the sample was randomly selected with a response rate of 66%. In total, 8.3% of the students reported illicit use of prescription stimulants. Around three-quarters of the

students had used Adderall®or generic or similar medicaments during the last year whilst almost one fourth of them had used Ritalin®or generic medicaments. A higher rate of illicit prescription stimulant use was found for Hispanic and Caucasian students compared to Asians and African-Americans. The most common reasons to take such drugs as CE were to help with concentration, to help study and to increase alertness.

In 2007, Sahakian and Morein-Zamir asked the readers in their commentary in the scientific journal 'Nature' if they could imagine increasing their brainpower through the use of drugs [10]. On account of the high number of comments by readers, 'Nature' launched an online survey concerning the usage of methylphenidate (Ritalin®), modafinil (Provigil®) and betablockers [25]. A total of 1400 'Nature'-readers from 60 different countries responded to the online survey. It is important to note here that this sample was not randomly selected. The analysis of the data revealed that one out of five participants had taken one of these drugs for non-medical reasons in order to enhance their focus, concentration or memory [25]. The most common CE here was Ritalin®(62% of the users of this sample). 44% of the users of CE took modafinil and 15% betablockers. Therefore, some of the respondents hade taken more than one of these three CE. In addition, 80 participants specified other drugs which they had taken as CE. Most common among these was Adderall®, whilst others reported various alternative medicines such as Ginkgo biloba and omega-3 fatty acids [25]. Roughly half of the users reported unpleasant side effects including headaches, jitteriness, anxiety and sleeplessness. One-third accessed the drugs via the Internet, slightly more than half via prescription (52%) and the remaining participants obtained the drugs from pharmacies [25].

A systematic review regarding the misuse of ADHD medication was published in 2008 [60]. PubMed was searched using the key words 'misuse', 'diversion', 'stimulants', 'illicit use', and 'ADHD medications' from 1995 to 2006. Studies examining other psychostimulant misuse or abuse were not included. The authors analysed 21 studies among a total of 113'145 study participants. Nineteen studies were surveys, whilst the other two involved an interview and a chart review respectively. The review revealed that past year nonprescribed stimulant use ranged from 5-9% in grade and high school age children. In college-age individuals, this range was 5%-35%. Data pertaining the included studies suggested that students who were white, members of fraternities or sororities, individuals with lower grades, use of immediate-release compared to extended-release preparation, and students who report ADHD symptoms are at higher risk of misusing as well as diverting such products. Lifetime rates of diversion of students with stimulant prescriptions ranged from 16%-19%. The reported reasons for taking such products included, to concentrate, to improve alertness, to get high or to experiment [60].

The first German survey concerning CE was an online questionnaire conducted by the 'Deutsche Angestellten-Krankenkasse' (German health insurance for employees) among 3017 German employees between 20 and 50 years in 2008 [3]. Indeed, 5% of the respondents admitted that they had taken drugs as a healthy person in order to increase their achievement or complacency. Less than 2.5% of all the participants were taking such drugs continuously. Four out of ten of these continuous users were consuming it a few times per week or even on a daily basis (less than 1% of the 3000 employees). More-

over, 44% of the users had taken drugs to tackle anxiety, nervousness and discomposure, followed by drugs against depression (35%). Drugs against ADHD were taken by 13% of participants. For around 45% of the users it was possible to source the drugs from a pharmacy without the need for a prescription. This showed that many of the users were referring to products, which were available without any prescription. 12% of them bought it via Internet pharmacies whilst 14% sourced it from a pharmacy or a physician on prescription. Slightly more than one fifth of these 3000 employees (21.4%) received a recommendation to take such drugs without any therapy. Such recommendations were mostly formulated from direct social environments like families or friends. Around half of the participants (49.9%) held the view that the usage of such drugs without any therapeutic necessity is aligned with risks which overrule the benefits.

These surveys represented the current state of research when I started my Ph.D. in 2010. Since then, various CE surveys have been published. I will summarise the major ones (exclusion was when less than 500 people were participating) according to the profession of the participants, the country of origin and the year of data collection.

These surveys were found by a search logarithm which I started on 'PubMed' in 2010: "neuroenhancement" (All Fields) OR "neuroenhancements" (All Fields) OR "cognitive enhancement" (All Fields) OR "neuro enhancement" (All Fields) OR "pharmacological enhancement" OR "pharmacological neuroenhancement". In addition, I also regularly checked researchers in the field of surveys on CE and looked at the references of literature in the field.

1.6.2 Surveys after 2010 - Students

Germany

A paper-and-pencil survey concerning the knowledge and handling of CEs was conducted in Germany in 2009/2010 [61]. The CEs were methylphenidate (Ritalin®, Concerta®) amphetamines (Adderall®) and Modafinil and were defined as non-medical use of prescription stimulants. In addition to this, the authors asked about the prevalence of the use of illicit stimulants exclusively for cognitive enhancement including ecstasy, cocaine and amphetamines. The participants included 1035 pupils (18-21 years old) and 512 university students (on average 24 years old). The analysis of the data showed that 1.3% of the participants had taken at least one of the prescription stimulants for non-medical reasons (0.8% of the pupils and 1.6% of the students). More of the participants had had experiences with the illicit stimulants as CE: The lifetime prevalence was 2.6% (2.4% of the pupils and 2.9% of the students). One third of the pupils had heard about the possibility of increasing cognitive abilities through the use of prescription stimulants and almost two thirds of them concerned illicit stimulants. Slightly less than two thirds of the students knew that each of the two categories could be used as CE.

A longitudinal survey was completed in Germany in 2010 [62]. 11'000 students were randomly selected from four previously randomly selected German Universities. At t1 5882 students responded (response rate 53.5%) of which 69.1% participated at t2. The lifetime prevalence of using prescription medicine in order to enhance cognitive efficiency without any medical necessity was 4.6%. A comparison of the two investigations involv-

ing the same participants at different time points revealed that an increased cognitive test anxiety increased the prevalence of medication use. Cognitive test anxiety was measured by three items on students worries: Thinking about the consequences of failing, worrying about one's results and thinking about what will happen if one does not do well.

Another cross-sectional, online study which took place in 2010/2011 and surveyed 8000 German students, was directly concerned with stress compensation and improved performance [63]. The sample was weighted according to gender, the school, the subject, the semester and the county for being representative. The response rate was 25%, and the data showed that 12% of the students had taken one or more substances to deal with the requirements of studying. With regard to the stimulants methylphenidate, modafinil, cocaine, amphetamines, MDMA (ecstasy), betablockers or cannabis, 5% of these students confessed to having taken at least one. In 55% of the cases the substance was taken for the preparation of an exam and in 45% it was taken in exam situations. When comparing the users of such substances and non-users, differences were found in relation to the confidence of one's future. Indeed, students who were confident about their future were more likely to be non-users than users.

At around the same time in 2010/2011 another online survey was conducted at a German University among 1324 participants [64]. The students were non-randomly selected. Of these students, 7% had used CE at least once during their life in order to improve cognitive performance or mood. In this instance, CE stood for prescription products like e.g. Ritalin®, modafinil, Adderall®and Prozac®, and the illicit drugs cocaine, heroine and ecstasy. Users were more likely to see CE as more beneficial and less harmful when compared to nonusers. The users also had more experience with lifestyle drugs compared to the nonusers, although no difference was found due to alcohol consumption. The main motives behind the use of CE were to manage a high level of stress and a large academic workload.

In addition, and again during the same time period, another online survey was conducted about CE on a non-randomly selected sample in Germany [65]. In total, 1053 students from a University in Berlin participated, with 2% admitting to having taken Ritalin®to enhance the study performance and 0.6% admitting to having taken modafinil. Overall, 1-13% of these students admitted to having taken medical (e.g. among others Ritalin®, Adderall®, Prozac®) or non-medical substances (cocaine, Ginkgo biloba, cannabis, caffeine pills) in order to enhance study performance. The most commonly cited reasons were to support concentration, to relax and to increase alertness.

Using the randomised response technique (RRT; for more information please read the discussion section of '2.2 Publication') a paper-and-pencil survey among 2569 students in Germany was conducted (no information about the year in which data was collected, but published in 2013) [66]. The percentage of participants found to have an estimated 12-months' prevalence of using cognitive enhancing drugs (stimulant drugs, caffeine tablets, cocaine, methyl-phenidate, and mephedrone) was 20%.

USA

2732 medical students participated in an online survey in the US (more precised in the greater Chicago area) in 2011 [67]. Overall, 18% of these medical students had used prescription stimulants at least once in their lifetime. Most often the preferred psychostimulants were amphetamine salts (Adderall®) or methylphenidate (Ritalin®, Concerta®, Metadate®, Methylin®). Such usage correlated with the use of drugs like ecstasy and having male gender. In most cases the students confessed to having received the drug from a friend or relative (48.5%), followed by receiving it from a psychiatrist (24.2%) or a classmate (23.7%). Reasons for this usage were most often for 'help me to study' (65.2%), followed by 'help me concentrate' (61.6%), 'stay awake' (36.4%) and 'increase my alertness' (35.4%). 'Treat my ADHD' was also mentioned by 24.2% of the students. Therefore, students taking it to combat an illness were included in the 18% of the users from this study.

A systematic review on publications between 1990 and 2012 regarding the use of methyl-phenidate among medical students was accomplished [68]. The search languages were English, Portuguese, and Spanish, whilst nine articles were included. A prevalence lifetime use of methylphenidate as NE was 8.3% to 9%.

In the year 2007, or before (no information about the year of data collection, but publication date was August 2007), four online surveys were conducted among undergraduates (not mentioned from which University, but authors from the USA) [69]. These surveys did not investigate the prevalence rate, but instead focussed on the concerns influencing the willingness to use CE. Studies one and two, with samples comprising 357 and 266 undergraduates respectively, examined the association between the effect of one's self-identity and the willingness to use CE. The authors concluded that people are less willing to enhance traits which are believed to affect the self (e.g. motivation and self-comfort) in contrast with traits, which have less of an effect on the self (e.g. memory ability, concentration) [69]. The third study, in which 359 undergraduates participated, again pertained to the willingness to enhance, although it also focussed on the desire to ban legal access to CE. Indeed, the willingness to enhance was again influenced by concerns about altering the fundamental self. On the other hand, the desire to ban legal access to CE was determined by moral concerns. Interestingly, this willingness to enhance was not associated with the desire to ban legal access to CE [69]. The fourth study surveyed 500 participants aged 18 to 45 years. The results suggest that advertisers can reduce their concerns about self-identity influencing the willingness to use CE by pointing out that CE are enabling rather than altering self-identity [69].

UK

In the UK, only non-peer-reviewed publications on surveys were found. One such anonymous online survey was conducted by 'Newsnight' and 'New Scientist' among readers in November 2011. Of the 761 participants, 38% answered that they have taken CE. Such CE included Ritalin®, Adderall®and modafinil. The survey, which was mentioned by the authors, is not representative of society [70]. 'The Guardian' and 'Mixmag' (a dance music and clubbing magazine) conducted another survey [71]. Of the 15'000 people in

the UK and in the USA, 15% answered that they hade taken an unknown white powder in the past 12 months. A third of them admitted that it was supplied by someone who they did not trust [71]. This survey was not about CE, but about the willingness of taking a drug with unknown side effects.

Switzerland

Up until very recently, no peer-reviewed survey among students had been published. It is in light of this that I will summarise here additional surveys about CE which have been conducted in Switzerland. Indeed, in 2008 a paper-and-pencil survey was accomplished in the example city Kreuzlingen for the German speaking part of Switzerland. Its aim was to answer the question of what society thinks of CE [72]. Two paper-and-paper questionnaires were established on action and political aspects respectively. The two main goals were to answer whether or not a person would like to take a CE him- or herself and whether CE should be allowed or forbidden for others. The questionnaire on political aspects contained an additional six reasons and ten concerns about CE. These concerns and reasons were established due to literature, media and open interviews accomplished by the author [72]. Around 2/3 of the 291 participants stated that they would certainly not or probably not take CE even if no side effects at all would appear (response rate: 14.6%). In addition, 1/5 of the participants would certainly or probably take CE whereas all others were unsure. The questionnaire on political aspects revealed that almost 2/3 would forbid it and approximately 1/4 would allow it. The other 11% were undecided (response rate: 11.5%). The three most common concerns were that these products represent an unnatural interference with the body, that one's own gut feelings tell oneself to keep away from such products, and that one would change and no longer be oneself. The three most common reasons for using CE were to learn more quickly, use them for prevention of age-related problems, and to regain lost mental vigour. Taken together, most of the participants would not take such a CE even if no side effects would appear and would forbid such CE in a society.

One non-representative online survey among Students of the University of St. Gallen (HSG) was conducted by authors of the magazine among the students of the HSG [73]. Of the 1025 participants, 3.1% answered that they were using Ritalin®in order to enhance performance.

On the same day as our study, a survey was published concerning the usage of cognitive enhancers among students in Switzerland [74]. 6275 students of the ETH in Zurich, the University of Zurich and the University of Basel completed an online survey out of 28'118 contacted students (response rate: 22.3%). Neuroenhancement was defined as the usage of prescription drugs or the usage of drugs of abuse including alcohol and cannabis in order to enhance cognitive function. The category of 'prescription drugs' included methylphenidate, modafinil, antidepressants, antidementia drugs, sedatives and beta-blockers. Whilst the category 'drugs of abuse including alcohol' obviously refers to alcohol, it also includes cannabis, cocaine, amphetamines, ecstasy and GHB/GBL. The survey included questions regarding so-called "soft enhancers" such as coffee, energy

drinks or vitamins, although these were not included in the neuroenhancement drug category. The lifetime prevalence of the participants for neuroenhancement according to prescription drugs was 7.6%. The most frequently used prescription drug was methylphenidate (4.1%), followed by sedatives (2.7%) and beta-blockers (1.2%). When focusing on the usage of drugs of abuse including alcohol, 7.8% of the participants had taken it for cognitive enhancement. The most common drug of abuse for such a purpose was alcohol (5.6%), followed by cannabis (2.5%), amphetamines (0.4%) and cocaine (0.2%). When asked about "soft enhancers" around half of the students had used coffee and approximately one-third had been drinking energy drinks in order to enhance their cognitive function. The three most frequently chosen reasons for taking such products pertained to increasing learning (66.2%), relaxation or sleep improvement (51.2%) and reducing nervousness (39.1%). More senior students, those reporting higher levels of stress and those who had previously used illicit drugs were more likely to have taken products for neuroenhancement.
A survey analogue to the survey conducted by Meiners among German employees was accomplished in Switzerland. The survey was ordered by 'Suva' (a Swiss accident insurance) and completed by 10'171 Swiss employees or people in education out of a representative sample [75]. Of these participants, 4% had taken, at least on one occasion, prescription drugs or drugs of abuse for enhancing cognitive function or mood without having a medical indication for such a usage. The employees with enhancement experience reported more often stress factors in the work place respectively as well as in education. They also reported a high pace of work, high deadline pressure, unnecessary breaks, a lack of control or a high competition pressure. Additionally, the average value on a scale about perceived self-efficacy was significantly below the average value of the sample.

Qualitative interviews with students concerning CE exist in Australia [76] and in the US [77, 78, 79, 80]. Indeed, papers with surveys which I have excluded because of participant numbers below 500 were surveys among: 372 medical students in the US [81]; 144 medical students in the US [82]; 77 undergrad students in Italy [83]; 184 students in the US [84]; 243 dental and dental hygiene students in the US [85], 308 health care students in the US [86], and misuse among 115 students with prescriptions for ADHD medications in the US [87].

Discussion of the Range of Frequencies

The observed range of frequencies for usage from 1% to 20% found in these studies (Table 1.2) could be due to different products being defined and included as CE. Another explanation could be the different data collection methods used in the surveys, such as e.g. RRT. This randomised response technique tries to overcome the problem of desired responses being given, due to stigmatisation and the social norms around illicit products, by offering full privacy protection and by adding random noise to the data [61, 66]. For example, a participant plays a dice and marks the answer 'yes' to a question whenever a 6 appears, otherwise she or he answers based on the question. Such noise can than be

subtracted from the data when the probability properties of the randomised device (here 1/6) are known. However, certain studies have shown that RRT does not improve the results from online questionnaires [88]. A recent study revealed that when asking about CE in an online survey, the best results were found with the 'crosswise model' technique, when compared to RRT or no techniques [88]. In the crosswise model technique [89], two questions are presented, of which one is sensitive (in our case the question if CE have ever been used) whilst the other is an unrelated and non-sensitive question. The participants only have to answer if their answers to both questions would be the same (2x yes or 2x no) or different. If the answer to the non-related question remains unknown, the same is the case for the sensitive question [88]. A non-sensitive question can be chosen only if the prevalence distribution of that question is known. Following this, the calculation is carried out in a similar way as for RRT. If the probability of answering the non-related question with yes would again be 1/6, then 1/6 of all the participants who answered the same to both questions answered yes to the sensitive question. Of the participants who did not give the same answers to the sensitive and non-related questions 5/6 answered the sensitive question with yes.
A comparison of web and mail surveys found that sensitive data was reported equally often in both methods [90]. The authors compared the prevalence of secondary consequences after substance use e.g. that an enjoyable event was spoiled, that sleep was disrupted or that they took care of someone with a drinking or drug problem [90].

Apart from one survey in Germany [62], all of the other surveys in the tables 1.2 and 1.3 are cross-sectional, meaning that one sample at one time was questioned. Longitudinal studies, whereby the same sample is questioned at different points in time, have an advantage over cross-sectional studies in that conclusions regarding casualisations can be drawn.

Taken together, a range of frequencies for usage was found in the studies (Table 1.2). This could be due to the products included as well as the data collection methods. The best results were found using the 'crosswise model technique' [88] whilst no differences were observed when comparing online and paper-and-pencil studies [90].

Table 1.2.: Quantitative surveys concerning the usage of CE

First author	Year*	Number of partic.	Method	Sample	Re.**	Country	Products	a)	b)
McCabe	2001	10'904 students	P-and-p	Randomly, countrywide	Yes	USA	Ritalin, Adderall®	6.9%	52%
Teter	2005	4589 college students	Online	Randomly, of 20'138 students	No	USA	Illicit use of prescription stimulants (e.g. Ritalin, Adderall®, modafinil)	8.3%	66%
Sahakian, Maher	2007	1400 nature readers	Online	Non-randomized	No	60 countries	(Ritalin), modafinil (Provigil) and betablocker	20%	—
Meiners	2008	3017 German employees	Online	?	?	Germany	Drugs as a healthy person for increasing their achievement or complacency	5%	Ca. 15%
Franke	2009 2010	1035 pupils & 512 students	P-and-p	Non-randomized	No	Germany	Methylphenidate (Ritalin, Concerta) amphetamines (Adderall®) and Modafinil	1.3%	—
Sattler	2010	T1: 5882 students, t2: 3486 students	Online	Randomly of 4 Unis	Yes	Germany	Use of prescription medicine for enhance the cognitive efficiency without any medical necessity	4.6%	53.5% at t1, 69.1% at t2.
Middendorff	2010 2011	8000 students	Online	Weighted by gender, school, subject, semester, county, countrywide.	Yes	Germany	Methylphenidate, modafinil, cocaine, amphetamines, MDMA (ecstasy), betablockers, cannabis	5%	25%
Eickenhorst	2010 2011	1324 students	Online	?	No	Germany	Use of Ritalin, Adderall®, modafinil, antidementia drugs, antidepressants, beta blockers, cocaine, heroin or ecstasy to improve cognitive performance or mood	7%	—
Mache	2010 2011	1053 students	Online	?	No	Germany	Use of medical (among others Ritalin, Adderall®, Prozac) and non-medical substances (cocaine, gingko biloba, cannabis, caffeine pills) to enhance the study performance	All: 1-13%, Rit: 2%, mod: 0.6%	—
Dietz	Before 2013	2569 students	P-and-p, RRT	Weighted by age, sex, and field of study at one Uni	No '	Germany	Stimulant drugs (amphetamines), caffeine tablets, cocaine, methylphenidate, mephedrone.	12 months prev: 20%	91%
Emanuel	2011	2732 medical students	Online	All students	No '	USA	Use prescription stimulants (incl. for treatment)	18%	41%
Franke	2011	1145 German - speaking surgeons on conferences	P-and-p, RRT	Non-randomized	No	Germany	The usage of a prescription or illicit drug exclusively for CE	8.9%	—
Maier	2012 2013	6275 students	Online	Non-randomized	No	Switzerland	1. Prescrption drugs or 2. drugs for abuse including alcohol for enhancing the cognitive function	1. 7.6%, 2. 7.8% All: 13.8%	—
Schaub	?	10'171 Swiss employees	Online	?	Yes	Switzerland	Prescription drugs or drugs for abuse for enhancing the cognitive function or mood without having a medical indication for such a usage	4%	—

P-and-p = Paper-and-pencil; ?= no information available; a) life time prevalence; b) Response rate (only included if randomly); * Year of data collection; ** Representative for the participants in this country; ' but for this University/Universities.

1.6.3 Surveys after 2010 - Physicians

Bergström et al. conducted a survey in 2006 among physicians in comparison with people of the general public in Sweden [91]. Participants in the paper-and-pencil survey came from a pool of randomly selected people and were 108 GPs and 517 people from the general public. Both groups had a negative attitude regarding the use of CE. This attitude was stronger amongst GPs than amongst the general public. Altruistic reasons were more often accepted compared to egoistic ones for a usage of such CE (Table 1.3).

Another online survey comprising 212 physicians took place in Canada and the USA [92]. The biggest concern for these physicians in relation to prescribing CE was possible side effects. More physicians would prescribe a secure and effective CE to a 65 year old person than to a 25 year old person (Table 1.3).

A paper-and-pencil survey was conducted in the USA [93]. The sample was randomly selected from all licensed physicians in the US with the exclusion of certain disciplines where patients would never ask for CE. 633 physicians participated (response rate: 46.4%). These physicians were very ambiguous with regard to CE. Most of them had concerns about cognitive enhancement, and particularly the social justice aspects. At the same time, many of these physicians answered that secure and efficient CE should be available but not paid for by health insurance. Most of these physicians had received requests for CE and partly prescribed them (Table 1.3).

A very recently published paper-and-pencil survey was sent to all 2753 registered primary care physicians in Rhineland Palatine in Germany [94]. Around 1/3 of these primary care physicians responded. More than 3/4 of them have at least once been asked for prescribing CE and almost all of them have heard of CE before. But only a minority stated that they are well informed about the possibilites of CE (Table 1.3).

In addition to this, a qualitative survey concerning wish-fulfilling medicine among 19 GPs and plastic surgeons in the Netherland also took place [95]. The interview analyses illustrated that arguments relating to patient autonomy, risks and benefits, normality and justice were mentioned with regard to limiting wish-fulfilling medicine. Arguments in favour of wish-fulfilling medicine pertained to empathy, patient doctor relationship and reassurance.

Table 1.3.: Quantitative surveys among physicians concerning the handling of CE

First author	Year*	Number of partic.	Method	Sample	Re.**	Country	Results	a)
Bergström	2006	108 physician (p) & 517 general public (gp)	P-and-p	Randomly in area around Stockholm	No	Sweden	Both groups: Negative attitude about use of CE, stronger amongst GPs. Altruistic reasons more often accepted than egoistic ones for use.	39% for p; 52% for gp
Banjo	Before 2010	212 physicians	Online	Non-randomized	No	USA & Canada	Main concern: side effects	—
Hotze	2007 2008	633 physicians	P-and-p	Randomly of all practicing physicians in the US	Yes?	USA	Concern about social justice aspect. Many phyisicans: Secure and efficient CE should be available but not paid for by health insurance. Most of physicians: Received request for CE and partly described them.	46.4%
Franke	2011	832 primary care physicians	P-and-p	To all 2753 registered primary care phsyisican in 'Rheinland-Pfalz' (state in Germany)	No '	Germany	Many of these physicians have been asked for CE. Only few of them: Well infomed about CE.	30.2%

P-and-p = paper-and-pencil; ?= no information available; a) Response rate (only induced if randomly); * Year of data collection; ** Representative for the participants in this country; ' but for this region.

Another survey, conducted among physicians, sought not to gauge their handling but instead to gauge their usage [96]. In 2011, the authors distributed short questionnaires at five international conferences of the German Society of Surgery to German-speaking surgeons. With the help of RRT, the life prevalence was calculated at 8.9% in this sample of 1145 surgeons (Table 1.2).

Surveys which I have excluded due to small sample size of less than 500 participants comprised a survey on 130 physicians in Belgium [97] and one survey published in Dutch which questioned 422 participants on the usage of physicians in the Netherlands [98]. All of the included surveys are presented in table 1.2.

1.7 Discussion and Legal Situation in Switzerland

In this final section of the introduction, I want to focus on the situation in Switzerland as this is the country in which the two surveys among students and among physicians of my Ph.D. took place.

Cognitive enhancement is a topic found in the media of Switzerland [e.g. 99, 100, 101, 102]. The government is supporting an informed discussion in the public by providing booklets and reports on this topic [21, 103, 63]. Indeed, the Swiss Academy of Medical Sciences has been working on human enhancement for some time. After holding a conference on this topic in 2007, the SAMW defined 'human enhancement' as a core area in 2008 [104] and has been generating a booklet on human enhancement published by the Swiss Academies of Arts and Sciences in 2012 [105]. In 2011, the Swiss National Advisory Commission on Biomedical Ethics in the field of human medicine (NEK-CNE) published a statement concerning CE [106]. The seven recommendations of the NEK were: 1) the physician is aware of changing the picture of medicine in public with a wide practice of prescribing such CE; 2) personal freedom must be accepted but never at the cost of justice and tolerance towards otherness; 3) a health risk of CE exists; 4) educational institutions are duty bound when it comes to the psychological health of their wards and employees and must counteract an overly high pressure to perform; 5) enhancement should never be confused with treatment in health politics; 6) CE can especially limit the freedom, personal rights and personal development of children wherefore parents and institutions of education and other people in charge of the care and custody of the child bear responsibility for each child but also for the future values and norms of our society; and 7) the current practice of prescription of psychotropic drugs must be surveyed in order to evaluate the reasons of a higher consumption and to protect children from overuse.

The substances methylphenidate (e.g. Ritalin®) and modafinil (e.g. Modasomil®), which are available in Switzerland, are both categorised as 'A' standing for a singular submission on prescription [107]. For Antidepressants, the memantine (antidementia drugs) and the three acetylcholinesterase inhibitors donepezil, galantamine and rivastigmine are classified as 'B'. 'B' stands for submission on prescription [107]. The antidepressant substances paroxetine, citalopram, reboxetine, fluoxetine, sertraline, fluvoxamine, moclobemide, bupropion, venlafaxine, escitalopram and duloxetine are all classified as 'B'

whereas certain products consisting of bupropion are also classified as 'A' [107].

One possible way in which to access CE, apart from having a prescription or receiving them from people with a prescription, is to purchase them from online pharmacies. A study from the European Alliance for Access to Safe Medicine (EAASM) analysed over 100 websites selling prescription-only medicines [108]. The study revealed that 90% of these websites sold such medicines without having seen an authorised prescription beforehand. The authors also ordered 36 prescription-only medicines, of which 62% were revealed, by way of chemical analysis, to be counterfeits. Of the 38% of authentic drugs, 33% were posted without an instruction leaflet. A follow up campaign by the EAASM in 2012 was designed to warn people wishing to purchase medicines via the Internet. The campaign involved the setting up of an apparently genuine online pharmacy website [109].

Taken together, there does exist material to inform the Swiss public about cognitive enhancers whilst the main institutions in the field of biomedical ethics have placed particular emphasis on this topic for some years now. As will be seen in Chapter 2, 3/4 of 1843 students knew that Ritalin®can be taken to enhance concentration or alertness in healthy people. Indeed, information material is available in Switzerland and there are indicators showing that at least some of the public are aware of CE. However, much of this information comes from the media, with studies showing that possible benefits are mentioned more often than potential risks and side effects [4, 2]. Bearing this in mind, as well as the fact that such CE can be easily ordered via online pharmacies, fostering a discussion in society relating to possible risks and side effects remains an important issue.

2 Survey among Students

2.1 Introduction

When starting my Ph.D. in 2010, no data about the usage of cognitive enhancers existed in Switzerland. As emphasised by the authors of the memorandum on cognitive enhancement published in 'Gehirn & Geist' in 2009 [1], such data is important for fostering an informed debate in society. As seen in section 1.4 on ethics and empirical data, such data can play an important role in ethics by contributing to the steps describing and assessing the moral question as well as evaluating decision-making.

Additionally, such data can uncover the views of students regarding cognitive enhancers. This is mainly important because as seen in section 1.1, a so called 'media hype' concerning cognitive enhancers exists [4]. Studies have shown that data about the possible benefits of cognitive enhancers are overexpressed in print media in relation to the possible negative effects of such products [2, 4]. Additionally, the data that was quoted for showing that the usage of such products is widespread are questionable [4]. By revealing the views of students and how their attitudes about cognitive enhancers are made, one can observe if the so called 'media hype' has an effect on the views and attidues of students and specific actions can be introduced in the future.

The online survey among students took about 10-15 minutes and was open during four months in the summer semester 2011. Four different ways of reaching students of the University of Zurich were introduced. For being able to separate the participants according to the way they have accessed the survey, four different URLs were given all leading to the same online survey. The following e-mail was sent out through the University of Zurich reaching 8642 undergraduate and graduate students who allow such emails to be sent to them.

Guten Tag,
Dein Verhalten und deine Meinung sind gefragt!
In den USA haben ca. 6 von 100 Studierenden schon einmal Ritalin oder Ähnliches genommen, um ihre Konzentration zu steigern.
Wie ist diese Verteilung an der Uni Zürich?
Unabhängig davon, ob du solche Produkte schon genommen hast oder nicht: Bitte nimm dir 15 Minuten Zeit für die Umfrage meines Doktorats und klicke auf den folgenden Link.
http://www.mnf.uzh.ch/umfrage1
Herzlichen Dank!
Regula Ott

Additionally, the 32 student councils of the University of Zurich were contacted and eight of these then distributed the survey email, reaching around 4300 students. The e-mail was almost identical with the one above, where only the URL was replaced by: http://www.mnf.uzh.ch/umfrage2, followed by the sentence: 'Falls du diese Umfrage bereits ausgefüllt hast, grosses Dankeschön und bitte nicht nochmals teilnehmen.' But such a second participation of a student would only be possible if different computers were used or cookies forbidden. In all the other cases a note would have appeared saying that the survey was already completed by that person. The third way for accessing the survey was by a link written on the following flyer (Figure 2.1), which was distributed in 19 major lectures of different study courses after giving a short summary about the survey as well as at the entrance of the University of Zurich. This way, around 3000 students were informed about this survey. The fourth URL was given to 63 individual students I know personally. For all three e-mails I used the address regula.ott@uzh.ch. Additionally, the University of Zurich was mentioned as the place the survey was constructed and not the Institute of Biomedical Ethics. This way we tried to reduce the pressure for socially acquired answers in order to improve the quality of the data. Additionally, the terms 'cognitive enhancement' or 'neuro-enhancement' and 'ethics' were not used in the survey. For the same purpose of reducing the pressure for socially acquired answers we did not talk of drugs but only of products when referring to Ritalin®, Adderall®and Modasomil®. 1935 students started the questionnaire, of which 1765 students completed

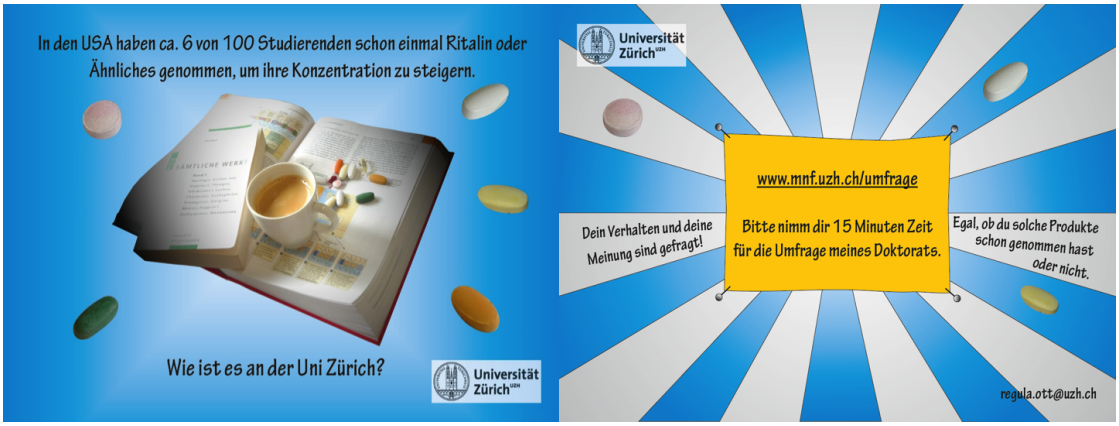

Figure 2.1.: Flyers distributed in lectures and at the University of Zurich

the survey. The results are published in the paper included in the next section and will be summarised in section 2.6.

2.2 Publication

The paper on the survey among students was published in the journal 'Pharmacopsychiatry' in November 2013. A print of the publication is included in this section.

Neuroenhancement among Swiss Students – A Comparison of Users and Non-Users

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Neuroenhancement among Swiss Students – A Comparison of Users and Non-Users

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Key words
- cognitive enhancement
- ethics
- questionnaire
- students
- Switzerland

Abstract

Introduction: This survey aims to contribute to the current discussion about neuroenhancement by comparing cognitive enhancer(s) (CE) users with CE non-users with a focus on their characteristics and attitudes.

Methods: An online survey was sent out to all undergraduate and graduate students of the University of Zürich who allow such e-mails (n = 8 642), accompanied by advertisement for the survey in lectures. 1 765 students completed the survey, which was about healthy people's use of Ritalin, Adderall and/or Modasomil to increase concentration and/or alertness. A complementary paper-and-pencil survey (n = 97 students, response rate: 95.1 %) was also carried out in order to compare data.

Results: Non-therapeutic CE users (6.2 %) were more often male, considered religion to be of less importance and had more experience with drugs. CE had been taken for study purposes by 4.7 % of all students. CE users had tried Ritalin most often, which about half of them received from friends and colleagues. The CE users had more reasons for and fewer concerns about taking CE than non-users. The most common reasons for both groups were "the effects of learning quicker" and "for finishing more work in less time". The most common concerns for both groups were "the worries about possible side effects" and "the goal of CE to achieve more", and "an unnatural interference of such products with our bodies" (CE-users) or "the gut feeling of not using such products" (CE non-users).

Discussion: The comparison of CE users with CE non-users reveals insights about their attitudes, which will add to the understanding of why students take or could imagine taking such products.

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Introduction

Neuroenhancement has been a matter of controversy in recent years, not only with regard to the moral and legal issues involved, but also in consideration of the role of cognitive enhancers (CE) in the everyday lives of different populations [1–3]. A number of studies focus on various user groups and the frequency of usage [4–11], with some concentrating on students [7–11], whereas several others explore the experiences and perceptions of prescribing physicians [12–15]. Even though the ethical and policy issues of CE have been intensely debated in Switzerland [16, 17], so far only a single survey has been carried out investigating the attitudes of the general population in one Swiss community [18].

The goal of our survey was to add empirical data about the characteristics and motives of CE users, defined as students who have already taken Ritalin, Adderall and/or Modasomil for increasing concentration and/or alertness as a healthy person, in comparison to CE non-users in Switzerland. Rather than contributing to what has been called media hype [20], such data will lead to a better understanding of why some students are taking CE and others are not, and how students conceive of these products. By focusing on CE users as well as CE non-users, further aspects of the perception of neuroenhancement in society can be observed. These insights could enrich current debates on how to deal with cognitive enhancers.

Existing literature and surveys include various understandings of CE e.g., [1, 2, 19]. The definition of CE we provided for the survey was purposely very narrow: "The use of Ritalin, Adderall and/or Modasomil for increasing concentration and/or alertness in a healthy person". Products very similar to these three were included (as

explained in the Methods section). By avoiding the term "neuroenhancement", we tried to prevent associations with various other possible definitions.
Our focus on the comparison between users and non-users rather than mainly investigating the users will add new data to the debate about CE and specifically to the situation in Switzerland.

Methods

Hypotheses

The hypotheses were formulated according to possible associations between the usage of CE and the following: demographic data; drug or alcohol use; use of products like coffee; conduction of methods like autogenic training; concerns about and reasons for using CE; self-evaluation of risk behaviour and case studies. The hypotheses were established on the basis of previous studies about the usage of CE [4–7] as well as proposed, possible associations concerning the usage of CE.

Survey design

The online survey of about 10–15 min was constructed with the software "Unipark" – a fee-based software for establishing online surveys. The questions were developed in line with current methodological recommendations (Prost, 2009). To avoid possible bias due to differing definitions of "neuroenhancement", we did not use the term "neuroenhancement" but instead the phrase "Ritalin, Adderall and/or Modasomil to increase concentration and/or alertness in a healthy person". Furthermore, we referred to Ritalin, Adderall and Modasomil as "products", and not as "pharmaceuticals" or even "drugs". We chose these three products as they are dominant in the current literature on neuroenhancement and are also used as reference products in other empirical surveys. The term "Ritalin" was defined as including the products Concerta, Focalin, Equasym, Medikinet, Daytrana and Metadate; the term "Modasomil" included Provigil, Vigilant and Modafinil.
Half-open answer categories were used when we could not be sure of covering all possible answers. The answer categories were presented in random order except when they represented a range.
The questions were grouped into 3 parts: demographic data; usage of CE; and personal attitudes toward such products. A paper-and-pencil version of the questionnaire (in German) is available from the authors (regula.ott@ethik.uzh.ch) upon request.
Students who had already taken Ritalin, Adderall and/or Modasomil to increase concentration or alertness without treating an illness ("CE users") and students who had not yet taken such products or who had taken them only to address the symptoms of an illness ("CE non-users") were separated with the help of filters.
The 2 questions addressing concerns about or reasons for taking CEs were based on arguments presented in the pre-existing Swiss questionnaire [18]. The questions about alcohol consumption and about risk were formulated in accordance with the standards of the Swiss Federal Office of Statistics.
The questionnaire was reviewed by 2 outside survey experts, and tested by 11 individuals who were mostly students and by one person with experience in survey design. In the pilot study, a space for commentary was added after each question, which generated around 60 comments that were then used to improve the questionnaire for the main study. The ethics committee that is responsible for human subject research in the Canton of Zurich exempted the study from review.
Different tools were applied to the survey to improve the quality of the data and to keep participants motivated: Plausibility checks triggering a comment if a participant's answers were ambiguous, filters and page triggers leading to specific phrased questions in response to previous answers.

The administration of the survey

A link to the survey was sent to all the undergraduate and graduate students of the University of Zurich who had already given the University permission to send them e-mails for research purposes (n = 8 642).
In addition, flyers advertising the survey were distributed during 19 major lectures, through which around 3 000 students were informed about the survey. The 32 student councils of the University of Zurich were also contacted and 8 of these then distributed the link among their students (n ≈ 4 300). 63 individual students (personal contacts of one of the authors, R.O.) received a personal e-mail inviting them to participate in the survey. We used different URLs to ensure that we could evaluate how the participant knew about the questionnaire. The survey was online for 4 months during the summer semester in 2011 (14 March 2011–12 July 2011). When cookies were allowed, the survey could not be filled out twice from the same computer.
In order to increase the validity of the convenience sample of the online survey, the same questionnaire was used in a small paper-and-pencil survey of 103 Bachelor and Master's students (biology) in a neurobiology lecture on 10 October 2011. The participants in this small survey were not included in the main survey because of possible bias due to the different method of collecting the data. Therefore, the paper-and-pencil survey was used for comparison purposes only.

Data analysis

Analyses were conducted using SPSS statistic Version 19.0.0 (SPSS Inc., Armonk, NY). Data cleaning was accomplished. We used univariate descriptive statistics to examine the distribution for the answer categories of each question. Bivariate analyses using Pearson's χ^2 tests and one t-test (question about risk) were completed to compare the group of CE users with the CE non-users. A Fisher's exact test was conducted if 20% or more of expected values below the value of 5 or any expected values below 1 were found. A stepwise binary linear regression was calculated with usage of CE as the dependent variable.

Results

1 765 students of the University of Zurich completed the survey. Most of these students (n = 1 311) participated by responding to the e-mail sent out through the University (74.3% of the 1 765 participants) and the response rate for this subset was 15.2% (1 311 of the 8 642 students who received the e-mail). The remaining 25.7% of participants completed the survey either after receiving an e-mail from one of the student councils (n = 238, 13.5%), after typing in the link on the flyer (n = 198, 11.2%) or after clicking on the link in a personal e-mail (n = 19, 1.1%).

Table 1 Demographic and drug use data for CE users and CE non-users.

Variable	Answer categories	CE non-users	CE users	p-value (χ^2 test)	Odds ratio	Confidence interval	p-value (Odds ratio)
all (n_{Total})	–	1722 (100%)	116 (100%)	–	–	–	–
gender	women*	1096 (63.7%)	49 (43.0%)	0.000	–	–	–
	men	624 (36.3%)	65 (57.0%)		2.330	1.588–3.419	0.000
political orientation	SP (left)	497 (28.9%)	31 (27.2%)	0.042			0.519
	GPS (green, left)	221 (12.8%)	12 (10.5%)				0.390
	CVP (Christian)	82 (4.8%)	0 (0%)				0.997
	FDP (liberal)	161 (9.4%)	20 (17.5%)				0.299
	GLP (green, liberal)	229 (13.3%)	17 (14.9%)				0.853
	SVP (right)*	112 (6.5%)	9 (7.9%)				–
	others	90 (5.2%)	7 (6.1%)				0.950
	none	328 (19.1%)	18 (15.8%)				0.367
religion	evangelical reformed	589 (34.2%)	28 (24.6%)	0.004	0.478	0.296–0.774	0.003
	roman catholic	530 (30.8%)	27 (23.7%)		0.513	0.315–0.835	0.007
	others°	120 (7.0%)	11 (9.6%)				0.817
	no affiliation*	483 (28.0%)	48 (42.1%)		–	–	–
importance of religion	very important	81 (4.7%)	3 (2.6%)	0.003			0.153
	important	186 (10.8%)	5 (4.4%)		0.308	0.123–0.771	0.012
	rather unimportant	488 (28.4%)	22 (19.3%)		0.517	0.320–0.838	0.007
	not important*	964 (56.1%)	84 (73.7%)		–	–	–
drugs*	cannabis	924 (55.0%)	89 (82.4%)	0.000			0.797
	ecstasy (=MDMA)	88 (5.2%)	37 (34.3%)	0.000	2.848	1.385–5.858	0.004
	cocaine	96 (5.7%)	33 (30.6%)	0.000			0.071
	LSD	51 (3.0%)	23 (21.3%)	0.000+	2.157	1.035–4.498	0.040
	amphetamine (e.g. Speed)	60 (3.6%)	29 (26.9%)	0.000			0.100
	thai-pills	5 (0.3%)	4 (3.7%)	0.001+			0.562
	magic mushrooms	120 (7.1%)	22 (20.4%)	0.000			0.272
	crack	6 (0.4%)	3 (2.8%)	0.014+			0.748
	heroine	10 (0.6%)	3 (2.8%)	0.039+			0.222
	none of these drugs taken*	731 (43.5%)	16 (14.8%)	0.000			0.097

* Reference variable for odds ratio; odds ratio only mentioned when p-value was <0.05

° Other Christian churches or communities, other churches or communities, Jewish, Muslim

+ Fisher's exact test was completed. n_{Total} can vary, due to missing values (between 0 and 4) and drop-outs (drug questions was more at the end of the questionnaire: n=110 and n=1679)

Considering all of the students at the University of Zurich, 8.9% of the students (licentiate, bachelor and master) filled out the questionnaire (n_{Total}=18823), as did 5.5% of all Ph.D. students (n_{Total}=4219). In absolute numbers, the most highly represented student groups were medical students (n=275), followed by psychology students (n=192) and law students (n=158).

To compare these results with those generated by a survey with a much higher response rate, students attending one major lecture were asked to fill out the questionnaire on paper (response rate: 95.1%). Of these students, 4.1% had taken CE to increase concentration and/or alertness (n=4, n_{Total}=98). This is not significantly different from the value of 6.2% for CE-users in the main sample (p=0.391).

Demographic data

1197 people in this sample were female (61.9%) and 732 were male (37.9%; 4 people did not choose a gender (0.2%). The median birth year was 1986 (n_{Total}=1923).

114 people in this sample used Ritalin, Adderall and/or Modasomil at least once in their life for increasing concentration and/or alertness as a healthy person (6.2%). 87 of these 114 people had used it for study purposes (4.7% of n_{Total}=1835); the other 27 people had used it as a "party drug" or out of curiosity and not in a specified situation.

A significant univariate association with the usage of CE (p<0.05) was found for gender, political view, and religion (**Table 1**). No difference was found due to age, field of study, level of study (undergraduate, teaching diploma, Ph.D.), average number of semesters, highest completed level of education of the mother or father, participation in student groups at the University, fraternity/sorority members, self-reported grades, housing or the financial situation of the person or their parents.

There were strong associations between the use of CE and drugs (**Table 1**). No difference between the 2 groups was found in the frequency of alcohol consumption (the median for both groups was "1–2 times per week").

A stepwise logistic regression was calculated using the variables that had a positive association with the usage of CE (**Table 2**). These variables are the ones in **Table 1**; the legal products coffee, Red Bull, guarana and cigarettes; autogenic training as a method for the purpose of increasing concentration and/or alertness; and their self-evaluation of the risk behaviour.

The logistic regression model includes gender, Red Bull, guarana, autogenic training, ecstasy, cocaine, LSD and "none of these drugs taken" as predictors for belonging to the group of CE users and can explain 19.4% of the variance (**Table 2**).

The model reveals that there is an increased chance of belonging to the group of CE users if male; having taken Red Bull or guarana; having performed autogenic training for increasing concentration and/or alertness; or having used ecstasy, cocaine or LSD. If none of these drugs had been taken, there was a decreased chance of belonging to the CE-user group.

Table 2 Stepwise logistic regression.

Variable	Regression coefficient	Standard error	p-value	Odds ratio	Confidence interval Lower	Upper
gender	0.478	0.219	0.029	1.613	1.051	2.476
red bull	0.462	0.230	0.044	1.588	1.012	2.490
guarana	0.702	0.264	0.008	2.017	1.201	3.387
autogenic training	0.989	0.422	0.019	2.687	1.175	6.147
ecstasy	1.029	0.342	0.003	2.797	1.430	5.471
cocaine	0.690	0.322	0.032	1.993	1.061	3.746
LSD	0.821	0.354	0.021	2.272	1.135	4.549
none of these drugs taken	−0.797	0.297	0.007	0.451	0.252	0.806

The categorical covariates (all variables except the one about risk) were compared to either the last answer category (political orientation, religion, importance of religion) or the first answer category (all the other variables)

Table 3 Why did you take Ritalin, Adderall and/or Modasomil? (Multiple answers possible).

	CE users (n = 114)
to be more concentrated.	85 (74.6 %)
out of curiosity as to how it takes effect.	66 (57.9 %)
to be more awake.	62 (54.4 %)
because I did not have enough time.	30 (26.3 %)
to receive better grades.	27 (23.7 %)
because I am stressed.	22 (19.3 %)
to get into the mood, e. g. at a party.	16 (14.0 %)
because others did it as well.	7 (6.1 %)
to decrease jet lag.	3 (2.6 %)
for another or additional reason, namely…	7 (6.1 %)

The answer categories one to nine were randomized. More than one of the answer categories could be chosen. No missing values and the median was 3 answers

Features of CE use

A positive association between the use of CE and the use of products to increase concentration and/or alertness in the last 12 months was seen for coffee, Red-Bull, guarana and cigarettes. A negative association with the use of CE was found if there had been no consumption of such products for this purpose. A positive association was also found between the use of CE and autogenic training for the same purpose.

Within our sample of students, 74.1 % knew that Ritalin could be taken as a CE. At least one product from the group containing "Concerta, Focalin, Equasym, Medikinet, Daytrana, Metadate" was identified as a known CE product by 9.1 % of students. "Provigil, Vigil, or Modafinil" were known to be CE products by 6.5 %, "Modasomil" by 3.9 % and "Adderall" by 2.8 % of students. 269 persons knew more than one of these products could be used for such purposes (14.6 %). However around a third of students (25.5 %) had not heard of any of these products being used for such a purpose. CE users knew each category of CE listed above significantly more often than the CE non-users (for all categories: p = 0.000).

164 students had taken at least one of the products (Ritalin [n = 159], Adderall [n = 4] or Modasomil [n = 15]) or brand names mentioned above. 46 of these students had taken these products (Ritalin in all cases) as treatment for a medical condition. Of the remaining 114 students (4 students dropped out), 99 had taken Ritalin for non-therapeutic purposes, 4 had taken Modasomil and 11 students had already taken several of these products. Possible reasons for non-therapeutic use by CE users are presented in **Table 3**.

CE non-users were also asked if they could imagine taking Ritalin, Adderall or Modasomil for the possible reasons mentioned in **Table 3**. Most of them gave the answers "no, rather not" or "no, never" to the reasons provided (n = 1160, 68.8 %). In the cases where they could imagine taking these products, the most commonly chosen answer categories were "out of curiosity" (n = 358, 21.2 %), and "to be more concentrated" (n = 246, 14.6 %). Most of the CE-users (86.2 %) told at least one other person about their consumption. A little more than a quarter of CE non-users (27.2 %) knew at least one person using CE (most frequently 1–3 persons). Still more CE non-users (42.8 %) had heard about at least one person who was taking CE (without having heard it directly from the individual). Almost half the CE users indicated that they had received a neutral reaction from other people about their use of CEs. This contrasts with only 22.0 % (n = 371) of the CE non-users from this sample claiming they would have reacted neutrally. Two-thirds of CE non-users thought that using CE was not a good thing to do (67.3 %) and only 0.9 % agreed with such use (9.5 % answered that they could not decide; missing values: n = 5, 0.3 %).

Answers to questions about the frequency of CE use revealed that 44.4 % of the students who had taken Ritalin as a CE had already taken it more than 5 times in their life (n = 48). 34 students had taken it 2–5 times in their life (31.5 %) and 26 people once in their life (24.1 %). Modasomil and Adderall were taken much less frequently. Most of the CE users received the product from colleagues, friends or acquaintances (**Table 4**).

When asked about their estimation of side effects, significant differences between the CE users and CE non-users were observed for Ritalin [$\chi^2(5) = 144.87$, p = 0.000], with CE non-users more often choosing the options "rather critical" or "very critical". The CE users formed their opinions about the side effects most often by reading specialist literature (48.3 %, n = 42), whereas the CE non-users formed their opinions most often through the presentation of these products in the media (38.8 %, n = 343).

Personal attitudes towards CE

Study participants were presented with 3 case studies: 1) a 25-year-old healthy person, who is described as a friend of the participant and studies with him/her, taking Ritalin to increase their concentration; 2) the same type of person, but in this case taking anabolics to increase muscle size; and 3) a 65-year-old healthy person taking a product to counteract an age-related decrease in intellectual performance. In all 3 scenarios, more CE users approved of these products being consumed than did CE non-users. Interestingly, significantly fewer students from both

groups were fine with the consumption of anabolics as compared to the consumption of Ritalin for the 25-year-old described.

Around one-third of the CE users agreed with the statement that the intake of such CE will be normal in 10 years, compared to 18.4% of the CE non-users. 90.6% of the CE users would be prepared to try a product without any side effects to increase IQ and a little more than half of them (51.9%) would try this "most probably more than once". This compares with only 57.9% of the CE non-users who claimed they would try such a product. A survey item containing a self-assessment of risk behaviour revealed that CE users considered themselves overall more ready to take risks than did the CE non-users.

2 questions were asked about the acceptability of taking coffee or Ritalin before an exam. As expected, more of the CE users think that the use of Ritalin before an exam is acceptable than do the CE non-users; in general, more of the students in both groups think that the intake of coffee is more acceptable than taking Ritalin.

Table 5 illustrates that CE non-users have more concerns about the use of CE than CE users and **Table 6** shows that CE users more often agreed with possible reasons for taking CE products than did CE non-users.

Table 4 Source of product.

a) Where did you get the product in question? (Multiple answers possible)	**Ritalin (n = 106)**	**Adderall (n = 4)**	**Modasomil (n = 14)**
from colleagues, friends or acquaintances.	59 (55.7)	2	6
from a physician.	25 (23.6)	1	5
from someone in my family.	14 (13.2)	0	0
in a pharmacy.	12 (11.3)	0	1
via the Internet.	5 (4.7)	1	2
via another route, namely…	7 (6.6)	0	2
b) did you require a prescription for the supply of the product? If yes, from where did you get it? (Multiple answers possible)	**(n = 104)**	**(n = 3)**	**(n = 14)**
no, I did not require a prescription.	77 (74.0)	2	11
yes I did require a prescription. I received it from a physician.	23 (22.1)	1	3
yes I did require a prescription. I filled it out by myself.	0 (0.0)	0	0
yes I did require a prescription. I received it from some other non-physician.	4 (3.8)	0	0

The answer categories one to five for the first question were randomized. When the sixth answer category was chosen, no other answer categories were possible. Missing values in the first question: Ritalin: 1, Adderall: 7, Modasomil: 7. Missing values in the second question: Ritalin: 0, Adderall: 7, Modasomil: 7. Median for all products in both questions: one answer

Discussion

This survey was designed to obtain information about attitudes to neuroenhancement from a sample that allowed us to compare CE users with CE non-users. It was not constructed to be a representative study of a population. The values gained for frequency of usage of CE by healthy people for study purposes (4.7%) therefore must be understood with caution. The primary invitation to participate in the survey could only be sent to those students who allowed such e-mails, 33.7% of all students. It was therefore not possible to gain a representative sample from a random selection.

Concern about bias due to the study design could be addressed by comparing our sample results with those generated by a paper-and-pencil survey carried out with a further 97 students (response rate 95.1%), although this comparator sample was also not representative of the whole student population because it included students from only one major subject and semester group. Due to this selection process, some differences exist between the paper-and-pencil survey and the online survey, such as age (a median of 1988 compared to 1986) and the number of semesters (a median of 5.0 compared to 6.0); however, there were no differences with regard to gender. The major subject biology (n = 60 in the paper-and-pencil survey) was also the fourth most common subject in absolute numbers for the online sample.

Table 5 Concerns about the use of CE.

CE users: Which of the following possible concerns, about EXCESSIVE use of Ritalin, Adderall and/or Modasomil to increase concentration or alertness, do you agree with?
CE non-users: Which of the following concerns, about the use of Ritalin, Adderall and/or Modasomil to increase concentration or alertness do you agree with?

CE-users (n = 108); CE-non-users (n = 1 689)	**I agree**		**I don't agree**		**I don't know**		**p-value***
worries about possible side effects.	63.9	**81.9**	**28.7**	11.1	**7.4**	6.6	0.000
the goal when taking these products is that one can achieve more. I find such pressure to achieve more questionable.	59.3	**74.5**	**36.1**	17.5	4.6	**7.6**	0.000
these products represent an unnatural interference with our bodies.	55.6	**73.1**	**39.8**	17.2	4.6	**9.3**	0.000
there is a danger of becoming addicted.	51.9	**68.9**	**38.9**	18.2	9.3	**12.4**	0.000
if a lot of people do this, it could have bad effects on society.	48.1	**57.3**	**41.7**	21.7	10.2	**20.4**	0.000
my gut feeling tells me that we should keep our hands off such products.	40.7	**76.2**	**49.1**	15.8	**10.2**	7.8	0.000
that I would change and not being myself anymore.	33.3	**49.9**	**61.1**	31.8	5.6	**17.8**	0.000
I could not be proud of my own achievements anymore.	18.5	**42.4**	**76.9**	41.5	4.6	**15.7**	0.000
I would somehow be betraying people who do not use such products.	17.6	**34.2**	**76.9**	50.7	5.6	**14.6**	0.000
God created humans according to his plan. we should not try to improve upon this with such products.	2.8	**9.1**	**88.0**	74.3	9.3	**16.0**	0.014

The answer categories were randomized. For each sentence, one answer category could be chosen. There are no missing values for the CE users. Some missing values exist for the CE non-users (n = 4–10, 0.2–0.6%)

*The p-value was calculated with a χ^2-test and the 'I don't know' answers were treated as missing values. The CE users were in the following question asked what they define as an excessive use

Table 6 Reasons for the use of CE.
What are/could be reasons for you to take Ritalin, Adderall and/or Modasomil?
Please evaluate each statement INDEPENDENTLY of how you feel about the consumption of these products overall.

CE users (n = 106); CE non-users (n = 1 665)	I agree		I don't agree		I don't know		p-value*
I could finish much of my work in less time and would therefore have more free time and less stress.	**64.2**	35.6	34.9	**54.3**	0.9	**9.8**	0.000
I could learn more quickly by using these products and perhaps understand things that I did not understand before.	**59.4**	38.9	35.8	**51.7**	4.7	**9.3**	0.000
I could regain lost mental vigour, because sometimes I don't feel as fit mentally as I did previously.	**44.3**	22.9	49.1	**65.3**	6.6	**11.5**	0.000
I could achieve more and better results and would progress more quickly in life. I would earn more money and live a more comfortable life.	**38.7**	21.1	50.9	**68.9**	**10.4**	9.8	0.000
I could gain more acceptance and respect because of a higher level of achievement attained by using such products.	**22.6**	13.1	67.0	**78.7**	**10.4**	7.9	0.010
These products could act as some sort of prevention. If my brain became fitter, I might suffer less from forgetfulness and related problems once I'm old.	**17.9**	9.9	76.4	**78.3**	5.7	**11.5**	0.010

The answer categories were randomized. For each sentence, one answer category could be chosen. There were 3–4 missing values (0.2 %) for the CE non-users, and none for the CE users

*The p-value was calculated with a χ^2-test and the 'I don't know' answers were treated as missing values

Furthermore, the findings from our survey are in line with previous data from surveys of students [7–11], especially with those of German students. A mailed survey from the USA with 10 904 students (data from 2001) revealed a lifetime prevalence of non-medical prescription stimulant use (Ritalin, Dexedrine or Adderall) of 6.9 % [7]. A paper-and-pencil survey carried out in Germany with 512 students and 1 035 school pupils showed that 1.6 % of the students and 0.8 % of the school pupils had taken Ritalin, Concerta, Adderall or Modafinil as a healthy person for non-therapeutic reasons at least once in their lives [8]. An online survey carried out with 8 000 students in Germany showed that around 5 % of participants took prescription substances to deal with the requirements of studying [9]. Using the randomized response technique (RRT) in a paper-and-pencil survey among 2 569 students in Germany, the estimated 12-month prevalence of cognitive-enhancing drug use (stimulant drugs, caffeine tablets, cocaine, methylphenidate and mephedrone) was found to be 20 % [10]. The lifetime prevalence for the non-medical usage of psychostimulants, such as methylphenidate or amphetamine salts was found to be 18 % in an online survey of 2 732 medical students in the USA [11]. Future representative studies in Switzerland will reveal if our data concerning the number of CE-users are biased. In such surveys, we propose to include less common products, such as Metoprolol (a beta blocker), Aricept (an antidementia drug consisting of the substance donepezil) and Strattera (atomoxetine).

The wide range of frequencies for usage found in these studies could be due to different products being defined and included as CE. We focused in our survey on Ritalin, Adderall and Modasomil because these 3 products are the most dominant ones in the current literature about NE as well as in previous surveys. Another reason for the wide range of frequencies could be due to different data collection methods and techniques, such as RRT [10]. This randomized response technique is used to try to overcome the problem of desired responses being given, due to stigmatization and the social norms around illicit products, by offering full privacy protection and by adding random noise to the data [21]. For example, a participant plays a die and marks the answer "yes" to a question whenever a 6 appears; otherwise she/he answers based on the question. Such noise can than be subtracted from the data when the probability properties of the randomized device (here 1/6) are known. Some studies have shown, however, that RRT does not improve the results from online questionnaires [21]. A very recent study revealed that when asking about CE in an online survey, the best results were found with the "crosswise model" technique, as compared to RRT or no technique [21].

To keep the rate of untruthful but "desired" answers as low as possible, we tried hard to phrase the questions in a non-suggestive way and had them tested by survey experts. For the same reason, we also removed any reference to the Institute of Biomedical Ethics as a sponsor of the study, and only referred to the University of Zürich as the place where the survey was generated. We also used the more neutral term "products" instead of drugs or medicines when summarizing different CE. The term "neuroenhancement" did not appear in our survey either, in an attempt to keep the influence of the many media-driven perspectives as low as possible. Such careful use of neutral terms could have been confusing or misleading for participants who may have noticed that the term "neuroenhancement" was missing. However, we believe that the exclusion of this term had a greater benefit on the quality of our data than the negative effect of possibly misleading some participants. None of the 146 comments received from the participants refer to them expecting to have seen the term "neuroenhancement".

Study participants were assured at the very beginning of the survey that their anonymity would be guaranteed. Also, at the start, participants were given more general questions before being gradually and successively guided toward more sensitive questions about CE-use.

To keep the number of drop-outs as small as possible, many filters were used that allowed us to tailor subsequent questions based on previous answers. Another way to further decrease drop-outs could have been to use a paper-and-pencil survey in lectures, which generally leads to a higher response rate [22]. However, we decided to conduct an online survey, and to therefore rely on participants' intrinsic motivation rather than the pressure of filling out a paper questionnaire while being observed. For the same reason, no incentives were offered. In this way, we hope to have kept the rate of false answers as low as possible for this type of study design.

The reliability and validity of each question was not tested in a previous methodological study due to the time frame of this work. We tried to increase the validity of the data through a

pretest of the questionnaire, an attempt to neutrally phrase the questions, the usage of established and well tested questions whenever possible (some about the demographic data and the self-assessment of the risk-behaviour) and different tools like plausibility checks and filters that were applied to the survey.

Understanding the characteristics and motivations of CE users is key to formulating an appropriate public health response. One finding from this survey that might be important with a view to potential future regulation, was that more than half of the CE users received the product(s) from friends or colleagues, and only a little less than a quarter of the students from a physician. Another insight gained from this survey is that the ranking of reasons for, and concerns about, CE given by both of CE users and CE non-users was similar; however, unsurprisingly, possible reasons for CE use are more frequently affirmed by users, and possible concerns about CE use more often by non-users.

We hope that these data about attitudes toward CE use, together with existing empirical data, will lead to a more balanced media presentation of CE use, and a better informed public debate. The findings from this survey can lead to a better understanding of why some students are already taking such products and can also add to the discussion on social norms and values in the context of legalizing or prohibiting such products.

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Conflict of Interest

The authors declare no conflicts of interest.

References

1 *Greely H*, *Sahakian B*, *Harris J et al.* Towards responsible use of cognitive-enhancing drugs by the healthy. Nature 2008; 456: 702–705
2 *Ragan CI*, *Bard I*, *Singh I.* What should we do about student use of cognitive enhancers? An analysis of current evidence. Neuropharmacology 2013; 64: 588–895
3 *Forlini C*, *Hall W*, *Maxwell B et al.* Navigating the enhancement landscape. EMBO Rep 2013; 14: 123–128
4 *Sahakian B*, *Morein-Zamir S.* Professor's little helper. Nature 2007; 450: 1157–1159
5 *Maher B.* Poll results: look who's doping. Nature 2008; 452: 674–675
6 *Meiners F.* DAK-Gesundheitsreport. Deutsche Angestellten-Krankenasse. 2009; [cited 14 February 2013]. Available from http://www.presse.dak.de/ps.nsf/Show/A9C1DFD99A0104BAC1257551005472DE/$File/DAK_Gesundheitsreport_2009.pdf
7 *McCabe SE*, *Knight JR*, *Teter CJ et al.* Non-medical use of prescription stimulants among US college students: prevalence and correlates from a national survey. Addict Abingdon Engl 2005; 100: 96–106
8 *Franke AG*, *Bonertz C*, *Christmann M et al.* Non-medical use of prescription stimulants and illicit use of stimulants for cognitive enhancement in pupils and students in Germany. Pharmacopsychiatry 2011; 44: 60–66
9 *Middendorff E*, *Poskowsky J*, *Isserstedt W.* Formen der Stresskompensation und Leistungssteigerung bei Studierenden. HISBUS-Befragung. HIS: Forum Hochschule; 2012
10 *Dietz P*, *Striegel H*, *Franke AG et al.* Randomized response estimates for the 12-month prevalence of cognitive-enhancing drug use in university students. Pharmacotherapy 2013; 33: 44–50
11 *Emanuel RM*, *Frellsen SL*, *Kashima KJ et al.* Cognitive enhancement drug use among future physicians: findings from a multi-institutional census of medical students. J Gen Intern Med 2013; 28: 1028–1034
12 *Bergström LS*, *Lynöe N.* Enhancing concentration, mood and memory in healthy individuals: an empirical study of attitudes among general practitioners and the general population. Scand J Public Health 2008; 36: 532–537
13 *Banjo OC*, *Nadler R*, *Reiner PB.* Physician attitudes towards pharmacological cognitive enhancement: safety concerns are paramount. *Priller J.*editor. Plos One. 2010; 5: e14322
14 *Hotze TD*, *Shah K*, *Anderson EE et al.* "Doctor, would you prescribe a pill to help me …?" A national survey of physicians on using medicine for human enhancement. Am J Bioeth 2011; 11: 3–13
15 *Ott R*, *Lenk C*, *Miller N et al.* Neuroenhancement – perspectives of Swiss psychiatrists and general practitioners. Swiss Med Wkly 2012; 142: w13707
16 *Eckhard A*, *Bachmann A*, *Marti M et al.* Human enhancement. Studie des Zentrums für Technologiefolgen-Abschätzungen. Zürich: vdf Hochschulverlag AG an der ETH Zürich; 2011
17 *Akademien der Wissenschaften Schweiz.* Medizin für Gesunde? Analysen und Empfehlungen zum Umgang mit Human Enhancement. Bern: Akademien der Wissenschaften Schweiz; 2012
18 *Biedermann F.* Die Haltung der Deutschschweizer Bevölkerung zum Pharmazeutischen Cognitive Enhancement. Dissertation. Basel: Eigenverlag; 2011
19 *Lieb K.* Hirndoping: warum wir nicht alles schlucken solllten. Mannheim: Artemis & Winkler; 2010
20 *Partridge BJ*, *Bell SK*, *Lucke JC et al.* Smart drugs "as common as coffee": media hype about neuroenhancement. Ross JS (ed.). Plos One. 2011; 6: e28416
21 *Hoeglinger M*, *Jann B*, *Diekmann A.* Sensitive questions in online surveys: an experimental comparison of the RRT and the crosswise model. Paper presented at the Annual Meeting of the American Sociological Association, New York 2013
22 *Sax LJ*, *Gilmartin SK*, *Bryant AN.* Assessing response rates and nonresponse bias in web and paper surveys. Res High Educ 2003; 44: 409–432

2.3 Results of each Question

This section includes the analyses of each question of the survey among students and will give a detailed picture of the sample as well as of the two subgroups of CE-users and -nonusers. The questionnaire is included in the Appendix A (p. 117).

2.3.1 Part One - Demographic Data

In absolute numbers was the most chosen major subject human medicine (n=275), followed by psychology (n=192) and law (n=158). When calculated in relation to the absolute numbers of each major subject in the spring semester 2011, the subjects with the highest percentage numbers were German language and literature, major in language and linguistics (28.6%, n=6), biochemistry (26.6%, n=17) and earth sciences (26.1%, n=6). The range of these values lies between 3.0% and 28.6% with an average value of 11.0%. When focusing on major subject with more than 100 students in total, cultural anthropology (23.5%, n=81) is followed by chemistry (20.1%, n=30) and human medicine (19.1%, n=275) are the most represented subjects. Analysed by the education level, 86.8% of the participants are Bachelor- and Master students and 12.1% are Ph.D. students with a total of 1933 students.

What is the highest finished education of your…?

(n=1912)	Mother	Father
Primary school	49 (2.6%)	34 (1.8%)
Secondary school	102 (5.3%)	60 (3.1%)
Apprenticeship	701 (36.7%)	600 (31.4%)
Apprenticeship with special academic courses	154 (8.1%)	112 (5.9%)
'Gymnasium' (High-School)	221 (11.6%)	83 (4.3%)
University / ETH	384 (20.1%)	762 (39.9%)
Others:	274 (14.3%)	227 (11.9%)
Unknown	23 (1.2%)	28 (1.5%)

Figure 2.2.: The answer categories were not randomized. Only single answers were possible. For the question about the mother's education, four missing values exist (0.2%) and for the question about the father, missing values are 6 (0.3%).

As seen in figure 2.2, the most common finished education of the mother was an apprenticeship (36.7%), followed by a degree from the University or ETH (20.1%). For the father, the order of these two is vice versa, 39.9% have a degree from the University or the ETH and 31.4% finished an apprenticeship.

The following question revealed that 9.0% (n=170) of the participants are actively involved in the student union or other organizations of the University of Zurich and 5.3% (n=100) of the students are members in fraternities.

As seen in figure 2.3, the most common range of the average mark of all modules at the University was '5.0-.5.4'. Due to the assumption that these values differ in relation

In which range lays your approximate average mark of all the so far attended modules of your major subject?

	All (n=1883)
2.5-2.9	1 (0.1%)
3.0-3.4	8 (0.4%)
3.5-3.9	25 (1.3%)
4.0-4.4	219 (11.6%)
4.5-4.9	470 (25.0%)
5.0-5.4	546 (29.0%)
5.5-6.0	252 (13.4%)
Difficult to say, because the majority of my modules of the major subject are graded with 'passed' / 'not passed'.	349 (18.5%)

Figure 2.3.: The answer categories were not randomized. Only single answers were possible. 13 participants did not answer this question and are therefore missing values (0.7%).

to the faculty, the answers were split according to the major subject. The highest percentage value for the answer '5.0-5.4' was found for the faculty of theology, the faculty of economics, business administration and information technology and the faculty of arts. The most common answer for the other faculties, which are the faculty of law, of medicine, of science and the Vetsuisse-faculty, was '4.5-4.9'.

For being able to calculate if the housing type has an influence on the possible use of Ritalin®, Adderall®or Modasomil®for CE, the participants where asked where they live (Figure 2.4).

Where do you live?

	All (n=1878)
With my parents / my parent.	697 (37.1%)
In a shared flat.	495 (26.3%)
As a couple in a flat, in a house.	324 (17.3%)
By myself in a flat.	219 (11.7%)
As a couple with children in a flat, in a house.	91 (4.8%)
In a student house.	24 (1.3%)
In:	30 (1.6%)

Figure 2.4.: The answer categories one to six were randomized. Only single answers were possible. There are no missing values.

Most of the participants live at their parent's place (37.1%) and 26.3% of these students in a shared flat (n_{Total}=1878). The following question was asking about the political view of the participants (Figure 2.5).

The distribution of the political view is wide, with the highest value for the social democratic party (28.6%) followed by the green liberal and the green party (13.4%;

If there would be national council voting next Sunday, to which party would you mainly give your vote? (Independent if you are entitled to vote or not)

	All (n=1878)
Social democratic party (SP)	537 (28.6%)
Green liberal party (GLP)	251 (13.4%)
Green party (GPS)	240 (12.8%)
Liberal party (FDP)	186 (9.9%)
Conservative party (SVP)	126 (6.7%)
Christian democratic party (CVP)	85 (4.5%)
Others	99 (5.3%)
None (not enough overlap, absence of knowledge or politically uninterested)	352 (18.7%)

Figure 2.5.: The answer categories one to six were randomized. Only single answers were possible. There are two missing values (0.1%).

12.8%). 18.7% of the participants choose the category 'none' because of the reasons seen in figure 2.5. The following question of the first part of the questionnaire was about religion (Figure 2.6).

Which confession respectively religion do you belong to?

	All (n=1875)
Evangelic Reformed church	628 (33.5%)
Roman Catholic church	570 (30.4%)
Other Christian churches or communities	69 (3.7%)
Jewish denomination	14 (0.7%)
Islamic denomination	28 (1.5%)
Other churches or communities	23 (1.2%)
No affiliation	543 (29.0%)

	Very important	Important	Rather not important	Not important
How important is religion for you in your daily life?	88 (4.7%)	198 (10.6%)	514 (27.4%)	1071 (57.1%)

Figure 2.6.: The answer categories were not randomized. The order of the answer was the frequency in Switzerland. Only single answers were possible. There are no missing values for the first question and four missing values for the second question (0.2%).

Around one third of the participants each are part of the evangelic reformed church respectively Roman Catholics. A bit less than 1/3 are not part of any Church and for more than half of the participants is religion not important in their daily life. When

How much money in total do you have at present for your disposal (contributions from your parents or other family members, own earning, scholarship, leans, etc.)?

	All (n=1857)
0-999 Fr.	605 (32.6%)
1000-1999 Fr.	580 (31.2%)
2000-2999 Fr.	263 (14.2%)
3000-3999 Fr.	163 (8.8%)
4000-4999 Fr.	62 (3.3%)
5000 Fr. or more	113 (6.1%)
Not specified	71 (3.8%)

Figure 2.7.: The answer categories were not randomized. Only single answers were possible. There are no missing values.

divided according to the different religion, the highest absolute and percentage value of 'very important' was found for 'other Christian churches or communities' (n=30, 43.5%).

The last demographic questions were about money; in detail about how much money the participants has for his or her own use per month figure 2.7) and how their family income is related to the average pre-tax household income (Figure 2.8). Around 1/3 of the participants each have 0-999 Swiss francs respectively 1000-1999 Swiss francs per month for their own use. In figure 2.8 are the answers to the question, how much their parents earn in comparison with the monthly pre-tax household income of 9150 Swiss francs.

The average monthly pre-tax household income amounts to ~9150.- Fr. In 2008 in Switzerland. How is the pre-tax household income of your parental home in relation to that (income of the parents or a parent due to work, income on investments, social contributions, alimony, renting, etc.)?

	All (n=1857)
Below average	398 (21.4%)
At average	508 (27.4%)
Above average	597 (32.1%)
Far above average	73 (3.9%)
I cannot answer that question reasonable.	278 (15.0%)

Figure 2.8.: The answer categories were not randomized. Only single answers were possible. There are three missing values (0.2%).

When combining the question about money with the question about the housing situation, one can see that most of the students, who have 0-999 sFr per month for their own

Which, if any, of the following products did you consume in the last 12 months to increase the concentration and/or alertness?

	All (n=1850)
Coffee	1282 (69.3%)
Coca Cola	740 (40.0%)
Red Bull	653 (35.3%)
Grape sugar (e.g. Dextro Energen)	641 (34.6%)
Black tea	520 (28.1%)
Cigarettes	252 (13.6%)
Guaranà (as pills, as add-ons in beverages or chewing gums, etc.)	215 (11.6%)
Khat	2 (0.1%)
I did not consume any of these products for increasing the concentration and/or alertness in the last 12 months.	206 (11.1%)

Figure 2.9.: The answer categories one to eight were randomized. More than one of the answer categories one to eight could be chosen. If the last category was chosen, no other answer were next to it selectable. There are no missing values and the median is the choosing of two answers (n=500). The median in this and all the following tables is calculated without the answers for which, if selected, no other answer were allowed to choose.

use, live at their parents' place (75.7% of all the students, who have 0-999 sFr and 66.4% of all the students, who live at their parents' place). The students who have 'between 1000-2000 sFr. per month for their own disposal live most often in a shared flat and the ones having 3000-4000 sFr. as a couple in a flat or in a house. The last category '5000 sFr or more' is the most common answer of the students who life as a couple with children in a flat or in a house.

2.3.2 Part Two - Attitudes towards CE

The first two questions of part two were about different products and activities that could be taken for CE. As seen in figure 2.9, most of the students are drinking coffee to increase their concentration and/or alertness. Of these coffee-drinkers have a bit more than 10% also used Guaranà.The most common activity to increase concentration and/or alertness while studying was learning pauses (79.2%, figure 2.10). Of the 303 participants who chose the category 'others/furthers' the most common entry was napping or similar expressions.

Figure 2.11 shows in detail of which products the students know of that they could be used as CE. As seen in the Appendix A.1 about the structure of the questionnaire among student, the question presented in figure 2.12 was the filter question to separate the CE-users from the CE-non-users from each other. The students were asked if they

What do you do to increase the concentration and/or alertness while learning or studying? (Multiple answers possible)

	All (n=1850)
Learning pauses	1466 (79.2%)
Sport	975 (52.7%)
Walks	734 (39.7%)
Stretching	224 (12.1%)
Yoga	132 (7.1%)
Autogenic training	65 (3.5%)
Others/furthers:	303 (16.4%)
No specific activities.	159 (8.6%)

Figure 2.10.: The answer categories one to six were randomized. More than one of the answer categories one to seven could be chosen. If the last category was chosen, no other answer were next to it selectable. There is one missing values and the median is the choosing of two answers (n=687).

From which of the following products or group of product do you know that it can be taken by healthy people to increase the concentration or alertness? (Multiple answers possible)

	All (n=1841)	CE-users (n=114)	CE-nonusers (n=1722)	p-vaule
Ritalin	1364 (74.1%)	106 (93.0%)	1253 (72.8%)	.000
Concerta, Focalin, Equasym, Medikinet, Daytrana, Metadate	168 (9.1%)	39 (34.2%)	128 (7.4%)	.000
Provigil, Vigil, Modafinil	120 (6.5%)	23 (20.2%)	97 (5.6%)	.000
Modasomil	72 (3.9%)	19 (16.7%)	52 (3.0%)	.000^{+}
Adderall	52 (2.8%)	15 (13.2%)	36 (2.1%)	.000^{+}
From none of these products	470 (25.5%)	7 (6.1%)	463 (26.9%)	.000

Figure 2.11.: The answer categories one two five were randomized and more than one category could be chosen from the first five answers. If the last category was chosen, no other answer were next to it selectable. There are two missing values and the median is the choosing of one answer (n=1100, without the 470 persons who haven choosen the last category). $^{+}$ If at least one of the expected values was below 5, a Fisher's exact test was completed.

have ever taken one of the following products at least once in their life (Figure 2.12).

Ritalin®, Adderall®and/or Modasomil®have been taken at least once by 164 persons of this sample (=1840-1676). These 164 students where than asked, for what they have taken Ritalin®, Adderall®and/or Modasomil®(Figure 2.13). For each product appeared a separate question according to their answers given in 2.12. The other 1676 students were led to the first question for the CE-non-users (Figure 2.23).

Have you ever taken one of the following products at least once in your life? Ritalin and Modasomil stand here and in all the following questions ALWAYS also for the products in the brackets. (Multiple answers possible)

	All (n=1840)
Ritalin (=Concerta, Daytrana, Metadate, Equasym, Medikinet)	159 (8.6%)
Adderall	4 (0.2%)
Modasomil (=Provigil, Vigil, Modafinil)	15 (0.8%)
No, I have never taken one of these three products.	1676 (91.1%)

Figure 2.12.: The answer categories were not randomized. More than one of the answer categories Ritalin®, Adderall®, and Modasomil®could be chosen. If the last category was chosen, no other answer were next to it selectable. There are no missing values (which would also not be possible, because this was one of the four questions which was mandatory for all participants). The median is one answer (n=152 without the 1676 persons who haven chosen the negative answer).

Of the 164 students who saw the question in figure 2.13, 46 were led to the questions of the CE-non-users because they answered that they have used these products only for the treatment of an illness (45 have taken Ritalin®and one person has taken Ritalin®and Modasomil®). Four persons stopped filling out the questionnaire. Therefore, 114 persons used Ritalin®, Adderall®and/or Modasomil®at least once in their life for increasing concentration and/or alertness as a healthy person (6.2%; n Total: 1835, (164-46-4). The term 'Ritalin®', 'Adderall®' and 'Modasomil®' were defined as standing also for the other products mentioned in the question of figure 2.12.

Nine students of the 114 CE-users tried already two of these three products (R+A=1, R+M=7, A+M=1) and two persons have used all three products. The other 103 persons used most often Ritalin®(n=99). Four persons took only Modasomil®and no one took only Adderall®.

The 21 students, who have chosen the third answer category in figure 2.13 and all the students, who would have taken one product as a treatment and another for CE (as seen was no one), saw the information: 'In the following questions I ask you to consider ONLY the consumption for increasing concentration or alertness. Therefore please do NOT take the the use of such a product to treat an illness into account. Thank you!'

The ten questions for the CE-users

The first of the ten questions for the CE-users was about possible recommendations for the consumption of Ritalin®, Adderall®and/ or Modasomil®(Figure 2.14). Most of the 78 persons (68.4%) having received an advice got it from colleagues, friends and acquaintances.

Most of the students have taken Ritalin®, Adderall®and/or Modasomil®in the preparation time before an exam (Figure 2.15). 67 students have chosen one answer category, 33 participants two answers and three students have clicked on all three answers. The

For what did you take Ritalin? …Adderall? …Modasomil?

	Ritalin (n=159)	Adderall (n=4)	Modasomil (n=15)
For the treatment of ADHS* or another illness, which was diagnosed for me.	46 (28.9%)	0 (0.0%)	1 (6.7%)
To increase the concentration WITHOUT that ADHS* was diagnosed by a physician.	88 (55.3%)	4 (100.0%)	14 (93.3%)
Both. To treat an illness and to increase the concentration as a healthy person.	21 (13.2%)	0 (0.0%)	0 (0.0%)

Figure 2.13.: *For Modasomil®, Narcolepsy was written instead of ADHS. The answer categories were not randomized. Only single answers were possible. Four students stopped filling out the questionnaire after answering that they have taken Ritalin®(Figure 2.11). There are no missing values.

Was the consummation of Ritalin, Adderall and/or Modasomil advised by someone? (Multiple answers possible)

	CE-users (n=114)
Yes, by colleagues, friends or acquaintances.	52 (45.6%)
Yes, by other students.	25 (21.9%)
Yes, by my physician.	14 (12.3%)
Yes, by someone of my family.	4 (3.5%)
Yes, by someone other/further, namely:	4 (3.5%)
No, by no one.	36 (31.6%)

Figure 2.14.: The answer categories one to four were randomized. More than one of the answer categories one to five could be chosen. If the last category was chosen, no other answer were next to it selectable. There are no missing values and the median is one answer (n=58; without the 36 persons who chose the exclusive answer 'No, by no one').

35 students who have chosen the answer 'In an other/further situation, namely' have most often written that they were taking it as a party drug (n=13). Three students have taken it for working and 10 students for finishing the licentiate or for studying in general. Six students have taken it out of curiosity and two people, who have chosen also other categories in this answer, for treating side effects of a medication. One person did not specify his or her use.
Taken together, 87 students have taken it in preparation of an exam or/and in an exam, or chose only the semi-open answer and wrote about the use for studying purposes. In relation to the sample of our survey, this means that 4.7% of all the participants have used Ritalin®, Adderall®and/or Modasomil®in the preparation time of an exam or in an exam (of which 25 students have taken it in both circumstances).

In figure 2.16, 20 students have chosen one out of 10 answers why they have taken

When did you take Ritalin, Adderall and/or Modasomil? (Multiple answers possible)

	CE-users (n=114)
In the preparation time before an exam.	76 (66.7%)
In an exam.	31 (27.2%)
In an other/further situation, namely:	35 (30.7%)
In no specific situation.	11 (9.6%)

Figure 2.15.: The answer categories were not randomized. More than one of the answer categories one to three could be chosen. If the last category was chosen, no other answer were next to it selectable. There are no missing values and the median is one answer (n=67; without the 11 persons who chose the exclusive answer 'No, by no one').

Why did you take Ritalin, Adderall and/or Modasomil? (Multiple answers possible)

	CE-users (n=114)
To be more concentrated.	85 (74.6%)
Out of curiosity as to how it takes effect.	66 (57.9%)
To be more awake.	62 (54.4%)
Because I did not have enough time.	30 (26.3%)
To receive better grades.	27 (23.7%)
Because I am stressed.	22 (19.3%)
To get into the mood, e.g. at a party.	16 (14.0%)
Because others did it as well.	7 (6.1%)
To decrease jet lag.	3 (2.6%)
For another or additional reason, namely…	7 (6.1%)

Figure 2.16.: The answer categories one to nine were randomized. More than one of the answer categories could be chosen. There are no missing values and the median is three answers (n=31).

CE. The other 94 students have clicked on two to seven answer categories. Of the seven students who clicked on the last category, four of them have only taken Ritalin®and wrote: 'for a better sleep', 'I have since my childhood trouble to focus, but no diagnose of ADHD' and 'increasing of performance sport'. One did not write anything. The students who have given the first two answers clicked also on the item: 'To be more concentrated'. One person who took Ritalin®and Modasomil®wrote: 'excessive demand' and did not clicked on any of the closed items. The seventh person of the ones chosen the semi-open answer has taken Ritalin®and Adderall®and wrote: 'exam anxiety reduction' in combination with the closed item 'to be more concentrated'.

Two questions about the frequency of the use of Ritalin®, Adderall®and/or Modasomil®are presented in figure 2.17. The two numbers each stand for the absolute number of students respectively after applying a filter according to the answers given in the key question in 2.12. Three differences between these numbers were seen. One student was saying that she has never taken Ritalin®, even though she was answering in a previ-

How often in your life have you taken Ritalin, Adderall and/or Modasomil ONLY for increasing the concentration or the alertness?

CE-users (n=113)	Ritalin	Adderall	Modasomil
Never before.	5 / 1	100 / 0	91 / 0
Once in my life.	26 / 25	2 / 2	4 / 3
Two- to five times in my life.	34 / 34	1 / 1	5 / 5
More than five times in my life.	48 / 48	1 / 1	5 / 5
When have you taken Ritalin, Adderall or Modasomil? Please do NOT take a possible consummation for treating an Illness in account, like f.e.ADHS or Narcolepsy. (n=107, n=12; n=21)			
NOT taken in the last 12 months.	38 / 37	8 / 3	9 / 5
NOT taken in the last 30 days.	44 / 44	0 / 0	5 / 4
Taken in the last 30 days.	25 / 25	1 / 1	4 / 4

Figure 2.17.: The answer categories were not randomized. Only single answers were possible. The first numbers stand for the absolute numbers of people who gave these answers and the second numbers stand for n, when a filter was used taking only these students in account, who have answered in the question about why they took one of these products with 'for CE' or 'for both, treatment and CE'. Missing values for the first question are for R=0, A=9, M=8. For the second question: R=0, A=3, M=3.
When 'never before' was answered in the first question, the second question was not seen for this CE. But the students who did not fill out the first question (=missing values) did see the second question for all three CEs. These students are the explanation of the additional numbers for Adderall® and Modasomil® in the first row of 'NOT taken in the last 12 months'. Two students stopped filling out the questionnaire after the first question in figure 2.17.

ous question (Figure 2.12) that she has taken Ritalin®, next to Modasomil®, for CE. Another person was answering that she has taken Ritalin® once in her life, even though she was choosing 'never before' for Ritalin® in the question of figure 2.12 and saw the questions for users only because she was declaring that she has taken Modasomil® for CE in figure 2.12. This person was answering in the second question about frequency that she has NOT taken it in the last 12 months. For Modasomil®, one person answered in the key question that he has only taken Ritalin®, but answered in the question about the frequency that he was taken Modasomil® once, but not in the last 30 days. These changes in the responses of these three students do not have a great impact on our data because we mainly focused on the number of students having taken CE at least once in their life. All these three students are included when focusing on their answers given in figure 2.12 as well as when focusing on the data in figure 2.17.

Most of the students received the product from colleagues, friends or acquaintances (Figure 2.18). The two comments were for Ritalin: 'From a home where I worked, there existed redundant boxes' and one student wrote for Ritalin® and Modasomil®: 'stayed abroad'. Differences between the value of the absolute numbers and when linked to the key question in figure 2.12 was seen for Ritalin® and for Modasomil® each (from

Where did you get the product in question? (Multiple answers possible)

	Ritalin (n=106/ n=105)	Adderall (n=12/ n=4)	Modasomil (n=21/ n=13)
From colleagues, friends or acquaintances.	59 / 58	2 / 2	6 / 5
From a physician.	25 / 25	1 / 1	5 / 5
From someone in my family.	14 / 14	0 / 0	0 / 0
In a pharmacy.	12 / 12	0 / 0	1 / 1
Via the Internet.	5 / 5	1 / 1	2 / 2
Via another route, namely…	7 / 7	1 / 0	2 / 2

Figure 2.18.: The answer categories one to five were randomized. More than one answer category could be chosen. The question was presented one to three times depending on the answers for the first question about the frequency The first numbers stand for the absolute numbers of people who gave these answers and the second numbers stand for n, when a filter was used taking only these students in account, who have answered in the question about why they took one of these products with 'for CE' or 'for both, treatment and CE'. There is one missing value for Ritalin® and seven missing values each for Adderall® and Modasomil®. The median for Ritalin® and Modasomil® is the choosing of one answer and for Adderall® it is cero answer.

colleagues, friends or acquaintances) and one for Adderall®(open answer). The persons who were responsible for these different numbers for Ritalin® and Modasomil® where the same students as described previously. The person who chose the open question for Adderall®, even though he did not declare in the key question of having taken Adderall® ever was not giving an answer about the frequency (missing value in the first question of figure 2.17). Therefore he is most probably a person who did not take Adderall® at all as declared in the key question in figure 2.12.

Most of the CE-users did not require a prescription (Figure 2.19). This is in line with the fact that most of the CE-users received the product from friends. Almost all of the students who have received the CE form friends have answered that they did not need a prescription.

When asked how people reacted when telling about their use of CE, about half of the students reported a neutral reaction (Figure 2.20). 18 persons have chosen more than one answer and various combinations were given. The most common one was approving and neutral (n=6), followed by neutral and diverse (n=4). The last two questions specifically for the CE-users were about possible concerns of an excessive use of Ritalin, Adderall® and Modasomil® and the student's understanding of excessive (Figure 2.21 and figure 2.22). The choice of these categories is explained in the method section of the publication. Highest agreement was found for the statement about possible side effects, followed by the one about the pressure to achieve more and about the unnatural interference. The concerns, where most of the students did not agree to, was about God, followed by the concern about betraying other people and about pride. The highest value of 'I don't know' was seen for the concerns about bad effects on the society and

Did you require a prescription for the supply of the product? If yes, from where did you have it? (Multiple answers possible)

	Ritalin (n=104)	Adderall (n=12)	Modasomil (n=21)
No, I did not require a prescription.	77 / 76	4 / 3	11 / 10
Yes I did require a prescription. I received it from a physician.	23 / 23	1 / 1	3 / 3
Yes I did require a prescription. I filled it out by myself.	0 / 0	0 / 0	0 / 0
Yes I did require a prescription. I received it from some other non-physician.	4 / 4	0 / 0	0 / 0

Figure 2.19.: The answer categories were not randomized. More than one answer category could be chosen. If the negative answer was chosen, no other answer was possible. The question was presented one to three times depending on the answers for the first question about the frequency. The first numbers stand for the absolute numbers of people who gave these answers and the second numbers stand for n, when a filter was used taking only these students in account, who have answered in the question about why they took one of these products with 'for CE' or 'for both, treatment and CE'. There are no missing values for Ritalin®and seven missing values each for Adderall®and Modasomil®. The median for Adderall®and Modasomil®is the choosing of cero answer and the median for Ritalin®is one answer (n=27, without the 77 persons who chose the negative answer). No multiple answers were observed.

Have you told at least one person about your consummation of Ritalin, Adderall and/or Modasomil? If yes, how were the reactions all in all? (Multiple answers possible)

	CE-users (n=109)
Yes I have told it and the reaction was approving about my action.	26 (23.9%)
Yes I have told it and the reaction was neutral about my action.	51 (46.8%)
Yes I have told it and the reaction was dismissive about my action.	14 (12.8%)
Yes I have told it and the reaction was diverse about my action.	26 (23.9%)
No, I have not told it anyone.	15 (13.8%)

Figure 2.20.: The answer categories were not randomized. More than one answer category could be chosen. If the first category was chosen, no other answer were next to it selectable. There are no missing values and the median is the choosing of one answer (n=91).

about the gut feelings. This question was the most complex and therefore time intensive one. Fortunately, only one person chose 10 times 'I agree', 3 persons have clicked ten times on 'I don't agree' and one person chose for every item 'I don't know'. Most of the students who have taken Ritalin, Adderall®or Modasomil®for CE define a daily consumption as excessive (Figure 2.22).

Which of the following possible concerns, about EXCESSIVE use of Ritalin, Adderall and/or Modasomil to increase concentration or alertness do you agree with?

CE-users (n=108)	I agree	I don't agree	I don't know
Worries about possible side effects.	69 (63.9%)	31 (28.7%)	8 (7.4%)
The goal when taking these products is that one can achieve more. I find such pressure to achieve more questionable.	64 (59.3%)	39 (36.1%)	5 (4.6%)
These products represent an unnatural interference with our bodies.	60 (55.6%)	43 (39.8%)	5 (4.6%)
There is a danger of becoming addicted.	56 (51.9%)	42 (38.9%)	10 (9.3%)
If a lot of people do this, it could have bad effects on society.	52 (48.1%)	45 (41.7%)	11 (10.2%)
My gut feeling tell me, that we should keep our hands off such products.	44 (40.7%)	53 (49.1%)	11 (10.2%)
That I would change and not being myself anymore.	36 (33.3%)	66 (61.1%)	6 (5.6%)
I could not be proud anymore about my own achievement.	20 (18.5%)	83 (76.9%)	5 (4.6%)
I would somehow be betraying people, who do not use such products.	19 (17.6%)	83 (76.9%)	6 (5.6%)
God created humans due to his plan. We should not try to improve upon this with such products.	3 (2.8%)	95 (88.0%)	10 (9.3%)

Figure 2.21.: The answer categories were randomized. For each sentence, one answer category could be chosen. There are no missing values.

From when roughly would you call a consummation as excessive?

	CE-users (n=108)
Several consummations per day.	20 (18.5%)
One consummation per day.	35 (32.4%)
One consummation per week.	21 (19.4%)
One consummation per two weeks.	8 (7.4%)
One consummation per month.	8 (7.4%)
One consummation per six months.	1 (0.9%)
I cannot define it.	15 (13.9%)

Figure 2.22.: The answer categories were not randomized. Only single answer were possible. There are no missing values.

The six to seven questions for the CE-non-users

These questions were for all students, who have answered in the key question that they have never taken Ritalin, Adderall®or Modasomil®or that they have taken it only for treating the symptoms of a disease, which was diagnosed by a physician.
All the questions for the CE-users, which were not linked directly to a consumption of products for CE were asked as well to the CE-non-users, often in a slightly different formulation. These were the questions about an advised consumption (Figure 2.23),

about concerns (Figure 2.25) and when the participants could imagine taking Ritalin, Adderall®or Modasomil®(Figure 2.26). The last question is about the number of people they have heard of and of people they know personally who have taken CE and was compared to the question of the CE-users about the reaction in the publication in section 2.2 (Figure 2.27 and figure 2.20).

Was the consummation of Ritalin, Adderall and/or Modasomil at least once advised to you? Please do NOT consider any advises for the treatment of an illness. If yes, of who? (Multiple answers possible)

	CE-nonusers (n=1719)
Yes, by colleagues, friends or acquaintances.	143 (8.3%)
Yes, by other students.	130 (7.6%)
Yes, by my physician.	19 (1.1%)
Yes, by someone of my family.	16 (0.9%)
Yes, by someone other/further, namely:	18 (1.0%)
No, by no one.	1449 (84.3%)

Figure 2.23.: The answer categories one to four were randomized. More than one of the answer categories one to five could be chosen. If the last category was chosen, no other answer were next to it selectable. There are no missing values and the median is the choosing of one answer (n=217, without the 1449 person who have chosen the last category).

84.3% of the CE-non-users have never received an advice to consume Ritalin, Adderall® or Modasomil®. When comparing these results with the answers of the CE-users in figure 2.14, one can see that more CE-users have received a recommendation for the use of CE than the non-users (see section on hypotheses, number 18 (p. 64)).

The 270 students who received an advice to take at least on of these three products where led to the following question about for what these products were suggested to take (Figure 2.24). The answer categories in figure 2.24 are very similar to the one presented in figure 2.16. Only the answer categories in figure 2.16 'out of curiosity how it takes effect' and 'to get into the mood, e.g. at a party' was not presented in this question as a possible answer and the question was slightly different. A similar question as seen in figure 2.16 was asked at a later stage to the CE-non-users (see figure 2.26).

As seen in figure 2.25, the concerns to which most of the CE-non-users agreed to was the worries about possible side effects, followed by the concern about the gut feeling and the pressure to achieve more. The concerns with the highest value of 'I don't know' were about the bad effects on society, followed by the concern about change of oneself and about God. The answer categories were the same as in figure 2.21. The only difference was the absence of the word 'excessive' in the question.

About 2/3 of the CE-non-users chose one of the two negative answers when asked if they could imagine circumstances where they would take CE (Figure 2.26). The most common positive answer was the one about curiosity of the effects (21.2%). Comments written in the semi-open answer were often similar to the quote 'If I have no other options to pass or to handle the work load'. The results of the comparison of the answers

Why respectively for what was Ritalin, Adderall and/or Modasomil advised to you? (Multiple answers possible)

	CE-nonusers, who received an advice (n=270)
To be more concentrated.	213 (78.9%)
To be more awake.	102 (37.8%)
To receive better grades.	75 (27.8%)
Because I did not have enough time.	50 (18.5%)
Because others did it as well.	27 (10.0%)
Because I am stressed.	23 (8.5%)
As a pharmaceutical.	20 (7.4%)
To decrease jet lag.	4 (1.5%)
For an other or additional reason, namely…	30 (11.1%)

Figure 2.24.: The answer categories one eight were randomized. More than one of the answer categories could be chosen. There is one missing value and the median is the choosing of two answers (n=93).

Which of the following possible concerns, about the use of Ritalin, Adderall and/or Modasomil to increase concentration or alertness do you agree with?

CE-nonusers (n=1689)	I agree	I don't agree	I don't know
Worries about possible side effects.	1383 (81.9%)	188 (11.1%)	111 (6.6%)
My gut feeling tell me, that we should keep our hands off such products.	1287 (76.2%)	267 (15.8%)	131 (7.8%)
The goal when taking these products is that one can achieve more. I find such pressure to achieve more questionable.	1258 (74.5%)	295 (17.5%)	129 (7.6%)
These products represent an unnatural interference with our bodies.	1234 (73.1%)	291 (17.2%)	157 (9.3%)
There is a danger of becoming addicted.	1163 (68.9%)	308 (18.2%)	210 (12.4%)
If a lot of people do this, it could have bad effects on society.	968 (57.3%)	367 (21.7%)	344 (20.4%)
That I would change and not being myself anymore.	842 (49.9%)	537 (31.8%)	301 (17.8%)
I could not be proud anymore about my own achievement.	716 (42.4%)	701 (41.5%)	265 (15.7%)
I would somehow be betraying people, who do not use such products.	578 (34.2%)	856 (50.7%)	246 (14.6%)
God created humans due to his plan. We should not try to improve upon this with such products.	154 (9.1%)	1255 (74.3%)	270 (16.0%)

Figure 2.25.: The answer categories were randomized. For each sentence, one answer category could be chosen. Missing values do exist for this question and n lies between four and ten (0.2-0.6%).

of the CE-users with the CE-non-users are seen in the next section 2.4 on the hypotheses (see number 19) and in the conclusion on p. 68. In the last question only for the CE-non-users answered more than half of the participants have not heard of someone who has taken Ritalin, Adderall®or Modasomil®and even more of them know someone personally.

Could you imagine taking Ritalin, Adderall or Modasomil under the following circumstances? (Multiple answers possible)

	CE-nonusers (n=1686)
Yes, because out of curiosity as to how it takes effect.	358 (21.2)
Yes, to be more concentrated.	246 (14.6)
Yes, to be more awake.	133 (7.9)
Yes, if I did not have enough time.	122 (7.2)
Yes, to receive better grades.	102 (6.0)
Yes, If I am stressed.	83 (4.9)
Yes, to get into the mood, e.g. at a party.	43 (2.6)
Yes, to decrease jet lag.	38 (2.3)
Yes if others do it as well.	22 (1.3)
For an other or additional reason, namely…	50 (3.0)
No, rather not.	583 (34.6)
No, never.	577 (34.2)

Figure 2.26.: The answer categories one to nine were randomized. More than one of the answer categories could be chosen. When one of the two last answers was chosen, no other answer was possible. The numbers in brackets are percentages. There is one missing value and the median is the choosing of two answers (n=108).

The four to five questions about side effects and drug and alcohol use

The CE-users and the -nonusers were asked how they estimate the side effects, separately for Ritalin, Adderall®and Modasomil®(Figure 2.28). If they did not chose the category 'hard to say, because one does not know enough about it' or 'I do not know the product well enough' for all three product, they were let to the follow-up question about how their opinion was established (Figure 2.29). Three-fourth or more of the students have chosen this last answer for Adderall®and Modasomil®, where more of the CE-non-users chose it compared to the CE-users. For Ritalin, more students have already made up their mind about the side effects; 57.0% of the CE-non-users and 93.5% of the CE-users.

The opinion about the side effects was most often formed by the presentation of these products in the media, followed by the reading of specialist literature (Figure 2.29). The most common answers of the students who chose the semi-open answer were about persons (mainly children) who are taking Ritalin®against ADHD, self-experience or education. For the CE-users, the answer about reading specialist literature is the first one, followed by the one about conversations with friends who are taking it and the one about media.

The data in figure 2.30 shows that more CE-users have experiences with these drugs. The calculation of a χ^2-test showed that these differences are significant. The two most common reasons for the use of drugs were significantly equally chosen when comparing the CE-users and the CE-non-users (Figure 2.31). For the other items, more students

Please consider in the following questions on this page only persons, who have taken Ritalin, Adderall or Modasomil exclusively for increasing the concentration or the alertness! This means, please do NOT consider persons, who took these products for the treatment of an illness.

CE-nonusers (n=1684)	0	1-3	4-6	7-9	10 and more
Of how many people have you heard of that they have taken in the last 12 months at least once Ritalin, Adderall or Modasomil?	964 (57.2%)	611 (36.3%)	68 (4.0%)	12 (0.7%)	20 (1.2%)
How many people have told you personally that they have taken in the last 12 months at least once Ritalin, Adderall or Modasomil?	1228 (72.9%)	414 (24.6%)	27 (1.6%)	2 (0.1%)	4 (0.2%)

Do you think it is right, if someone is taking Ritalin, Adderall or Modasomil without the diagnosis of an illness against which Ritalin, Adderall or Modasomil would be prescribed?	(n=1684)
Yes, I think that is good.	15 (0.9%)
No, I think this is not good.	1133 (67.3%)
I cannot decide yet.	160 (9.5%)
I do not care.	371 (22.0%)

Figure 2.27.: The answer categories were not randomized and only one answer for each question was selectable. Missing values are nine each for the first and the second question (0.5% each) and five for the third question (0.3%).

How do you estimate the side effects of Ritalin, Adderall or Modasomil?

	Ritalin (n=108 / n=1683)		Adderall (n=108 / n=1683)		Modasomil (n=108 / n=1683)	
Not critical	16 (14.8)	38 (2.3)	2 (1.9)	10 (0.6)	4 (3.7)	12 (0.7)
Rather not critical	38 (35.2)	199 (11.8)	2 (1.9)	28 (1.7)	8 (7.4)	34 (2.0)
Rather critical	24 (22.2)	472 (28.0)	7 (6.5)	95 (5.6)	5 (4.6)	104 (6.2)
Very critical	9 (8.3)	175 (10.4)	4 (3.7)	46 (2.7)	3 (2.8)	42 (2.5)
Hard to say, because one does not know enough about it.	14 (13.0)	74 (4.4)	3 (2.8)	37 (2.2)	5 (4.6)	38 (2.3)
I do not know the product well enough.	7 (6.5)	724 (43.0)	88 (81.5)	1465 (87.0)	81 (75.0)	1451 (86.2)

Figure 2.28.: The answer categories were not randomized. Only single answers were possible. Missing values are for Ritalin: 0 and 1 (0.1%); for Adderall®: 2 (1.9%) and 2 (0.1%); and for Modasomil®: 2 (1.9%) and 2 (0.1%). The question was presented in the transformed way, where the answer categories were the columns and the product names the rows. The numbers in brackets are percentages.

having experiences with CE were choosing them except the answer category about if

How was your opinion about the evaluation of the side effects formed? (Multiple answers possible)

	CE-users	CE-nonusers
Through the presentation of these products in the media (print media, TV, internet)	32 (36.8)	343 (38.8)
Through reading of specialist literature.	42 (48.3)	295 (33.4)
In conversations with friends and acquaintance who do not take them.	12 (13.8)	251 (28.4)
In conversations with trained persons (physicians, pharmacists, nursing staff)	22 (25.3)	215 (24.3)
In conversations with friends and acquaintance who take them.	33 (37.9)	195 (22.1)
Through nothing concretes, more my gut feelings.	11 (12.6)	144 (16.3)
Through something else/further, namely:	15 (17.2)	106 (12.0)

Figure 2.29.: The answer categories one to six were randomized. More than one of the answer categories one to seven could be chosen. There is one missing value and the median is the choosing of two answers (n=295). The numbers in brackets are percentages.

Have you one or multiple of the following substances at least once in your life consumed? (Multiple answers possible)

	CE-users (n=108)	CE-nonusers (n=1679)
Cannabis	89 (82.4)	924 (55.0)
Magic mushrooms	22 (20.4)	120 (7.1)
Cocaine	33 (30.6)	96 (5.7)
Ecstasy (=MDMA)	37 (34.3)	88 (5.2)
Amphetamine (e.g. Speed)	29 (26.9)	60 (3.6)
LSD	23 (21.3)	51 (3.0)
Heroine	3 (2.8)	10 (0.6)
Thai-pills	4 (3.7)	5 (0.3)
Crack	3 (2.8)	6 (0.4)
Others, furthers substances, namely:	10 (9.3)	58 (3.5)
No, I have not ever consumed one of these substances.	16 (14.8)	731 (43.5)

Figure 2.30.: The answer categories one to nine randomized. More than one of the answer categories one to nine could be chosen. If the last category was chosen, no other answer were next to it selectable. There are two missing values and the median is the choosing of one answer (n=749; without the last category). The numbers in brackets are percentages.

others do it as well. The three persons of the CE-users who chose the answer 'for treating an illness' did all use Ritalin®as a treatment against an illness and as a CE (one of these three persons did next to Ritalin®also use Modasomil®as a CE).

Most of the students reported that they drink alcohol 1-2 times per week (Figure 2.32). No differences according the use of alcohol was found between CE-users and -nonusers (see section 2.4 on the hypotheses, number 27).

Why did you take one or multiple of the substances listed in the last question? (Multiple answers possible)

n_{Total}=1787-(16+731)=1040	CE-users (n=92)	CE-nonusers (n=948)
Out of curiosity as to how it takes effect.	69 (75.0)	747 (78.8)
Because I enjoy the feeling, that is caused by the drug.	52 (56.5)	393 (41.5)
To get into the mood, e.g. at a party.	36 (39.1)	223 (23.5)
Because others did it as well.	8 (8.7)	161 (17.0)
To be more awake.	13 (14.1)	17 (1.8)
To be more concentrated.	11 (12.0)	7 (0.7)
To increase my achievement.	10 (10.9)	7 (0.7)
For an other or additional reason, namely…	12 (13.0)	83 (8.8)
For treating an illness.	3 (3.3)	12 (1.3)

Figure 2.31.: The answer categories one to seven were randomized. More than one of the answer categories could be chosen. The numbers in brackets are percentages. There are two missing values and the median is the choosing of one answer (n=529).

How often do you drink in general alcoholic beverages (beer, wine, champagne or high percentage alcohol)?

	CE-users (n=108)	CE-nonusers (n=1678)
3 times or more per day.	0	4 (0.2)
1-2 times per day (e.g. in each case before meals)	2 (1.9)	23 (1.4)
3 times or more than three times per week.	22 (20.4)	247 (14.7)
1-2 times per week.	48 (44.4)	627 (37.4)
1-3 times per month.	23 (21.3)	470 (28.0)
Less than monthly.	10 (9.3)	205 (12.2)
Never, abstinent.	3 (2.8)	102 (6.1)

Figure 2.32.: The answer categories were not randomized. Only one answer category could be chosen. The numbers in brackets are percentages. There are no missing values.

2.3.3 Part Three - Personal Attitudes

In this section, the students were asked about their personal attitudes. The first three questions were about a case study (Figures 2.33, 2.34 and 2.35).

Most of the students do not agree to both case studies, where more students think the case study with Ritalin®is fine for them (see hypothesis number 28.b). More of the CE-users chose in each of the cases 'that is fine for me' when compared to the CE-non-users (see hypothesis number 28.a). When applying the first case study to a 65 years old person, more of the CE-users are fine with such a use of CE (Figure 2.34; see hypothesis number 29.a). About half of the CE-users and even more of the CE-non-users think that the use of CE by the 25 years person is not the same compared to the one by the 65 years old person. Significantly more of the CE-users compared to the -nonusers answered with yes (see hypothesis number 29.b).

Please imaging a healthy 25 years old person. You are friends with that person and you are studying together. How would you react, when this person tells you, that he or she is taking…

All (n=1783)	That is fine for me.	That is NOT fine for me.	Neutral, that is his, her business.	I don't know how I would react.
… Ritalin to increase the concentration.	58 (3.3%)	822 (46.1%)	736 (41.3%)	167 (9.4%)
…Anabolics to increase the muscle size.	21 (1.2%)	1058 (59.3%)	593 (33.3%)	111 (6.2%)

Figure 2.33.: The answer categories were not randomized. Only single answers for each row were possible. There are no missing values. Underneath this question was a field for explanatory notes.

Please imaging a healthy 65 years old person, who is taking a product against the normal, age related intellectual degradation. What do you think of that?

	CE-users (n=108)	CE-nonusers (n=1671)
That is fine for me.	72 (66.7)	602 (36.0)
That is NOT fine for me.	2 (1.9)	198 (11.8)
Neutral, that is his, her business.	32 (29.6)	619 (37.0)
I don't know how I would react.	2 (1.9)	251 (15.0)

Figure 2.34.: The answer categories were not randomized. Only one answer category could be chosen. The numbers in brackets are percentages. There is one missing value for the CE-non-users (0.1%).

The question about normality seen in figure 2.36 revealed that more of the CE-users think that an intake of CE will be normal in ten years time (see hypothesis number 30). The following question asked about their appraisal of the use of coffee or Ritalin®before an exam. These two questions were presented at the same time and therefore have to be interpreted together (Figure 2.37). As expected, more of the CE-users do think the use of Ritalin®before an exam is acceptable (see hypothesis number 31.a). In general, more of the students think that the intake of coffee is acceptable than the one of Ritalin®(see hypothesis number 31.b).

The following question is the complement question to the one in figure 2.21 respectively in figure 2.25 about possible concerns of an (excessive) use of CE (Figure 2.38). The choice of these categories is explained in the methods.

The highest percentage of agreement was found for the reasons: 'I could learn quicker' followed by 'I could thereby finish much of my work in less time' for the CE-non-users. For the CE-users these two items were also the top ones but in the opposite order. The differences in the percentage of agreement between the CE-users and the CE-non-users are significant for all six categories (see hypothesis number 35.b). Next to that, the CE-users chose more often the answer 'I agree' than the CE-non-users (see hypothesis number 35.a).

Do you find the consummation of a healthy, 65 years old person due to the reason mentioned above the same as when a healthy 25 years old person takes the same product for increasing the concentration?

	Yes	No	Undecided
CE-users (n=108)	39 (36.1)	56 (51.9)	13 (12.0)
CE-nonusers (1671)	369 (22.1)	1012 (60.6)	289 (17.3)
All (n=1779)	408 (22.9)	1068 (60.0)	302 (17.0)

Figure 2.35.: The answer categories were not randomized. Only one answer category could be chosen. The numbers in brackets are percentages. There is one missing value for the CE-non-users (0.1%). Underneath this question was a field for explanatory notes.

Du you think that it will be normal in 10 years to take products like Ritalin, Adderall or Modasomil for increasing productivity?

	Yes	No	Undecided
CE-users (n=108)	34 (31.5)	44 (40.7)	30 (27.8)
CE-nonusers (n=1671)	308 (18.4)	1008 (60.3)	354 (21.2)
All (n=1779)	342 (19.2)	1052 (59.1)	384 (21.6)

Figure 2.36.: The answer categories were not randomized. Only one answer category could be chosen. The numbers in brackets are percentages. There is one missing value for the CE-non-users (0.1%).

Do you think it is acceptable if someone is taking coffee before an exam to increase his/her alertness and/or concentration?

	Yes	No	Undecided
CE-users (n=108)	105 (97.2)	2 (1.9)	1 (0.9)
CE-nonusers (n=1670)	1617 (96.8)	8 (0.5)	44 (2.6)
All (n=1778)	1722 (96.9)	10 (0.6)	45 (2.5)

Do you think it is acceptable if someone is taking Ritalin before an exam to increase his/her alertness and/or concentration?

	Yes	No	Undecided
CE-users (n=108)	63 (58.3)	21 (19.4)	24 (22.2)
CE-nonusers (n=1670)	271 (16.2)	1011 (60.5)	387 (23.2)
All (n=1778)	334 (18.8)	1032 (58.0)	411 (23.1)

Figure 2.37.: The answer categories were not randomized. Only one answer category for each question could be chosen. The numbers in brackets are in percentage. There is one missing value for both questions for the CE-non-users (0.1% each).

The frequencies of the answers of the question about taking a CE or not if it is without any side effects and for a finite number of time are presented in figure 2.39. More of the CE-users would give it a try and also chose more often 'most probably more than once'. The CE-non-users chose more often the negative answer.

What are/could be reasons for you, to take Ritalin, Adderall and/or Modasomil?

Please evaluate each statement and INDEPENDENTLY of how you feel about the consumption of these products overall.

CE-users / CE-nonusers = 106 / 1665	I agree	I do not agree	Undecided
I could learn more quickly by using these products and perhaps understand things that I did not understand before.	59.4% / 38.9%	35.8% /51.7%	4.7% / 9.3%
I could finish much of my work in less time and would therefore have more free time and less stress.	64.2% / 35.6%	34.9% / 54.3%	0.9% / 9.8%
I could regain lost mental vigour, because sometimes I don't feel as fit mentally as I did previously.	44.3% / 22.9%	49.1% / 65.3%	6.6% / 11.5%
I could achieve more and better results and would progress more quickly in life. I would earn more money and live a more comfortable life.	38.7% / 21.1%	50.9% / 68.9%	10.4% / 9.8%
I could gain more acceptance and respect because of a higher level of achievement attained by using such products.	22.6% / 13.1%	67.0% / 78.7%	10.4% / 7.9%
These products could act as some sort of prevention. If my brain became fitter, I might suffer less from forgetfulness and related problems once I'm old.	17.9% / 9.9%	76.4% / 78.3%	5.7% / 11.5%

Figure 2.38.: The answer categories were randomized. For each sentence, one answer category could be chosen. Missing values are 3-4 (0.2%) for the CE-non-users and none for the CE-users.

Would you take a product that would increase your IQ for a defined period of time and would be without any side effects?

	CE-users (n=108)	CE-nonusers (n=1663)
Yes, once to give it a try.	41 (38.7)	611 (36.7)
Yes and most probably more than once.	55 (51.9)	353 (21.2)
No, I would not try such a product.	7 (6.6)	487 (29.3)
Undecided.	3 (2.8)	212 (12.7)

Figure 2.39.: The answer categories were not randomized. Only one answer category could be chosen. The numbers in brackets are percentages. There are no missing values.

An association between the items 'they would not accept it' and 'that I study is very important for them' and the use of CE was found (Figure 2.40; see hypothesis number 33). Another association has been found between the self-assessment of risk behaviour where CE-users considered themselves overall more ready to take risks than did the CE-non-users (Figure 2.41).

The last question of this survey was about the possible sources of which they have heard about the survey (Figure 2.42). Most of the students who participated in this survey had received an e-mail from the University of Zurich.

How do you think would your parents react if you tell them, that you want to quit your studies and start a apprenticeship, for which you would have already a place? (multiple answers possible)

n_{Total}=1769	CE-users	CE-nonusers
They would be surprised.	63 (59.4)	1091 (65.6)
They would accept it.	61 (57.5)	1053 (63.3)
Essential is that I do find my way.	54 (50.9)	910 (54.7)
They would be disappointed.	41 (38.7)	511 (30.7)
That I study is very important for them.	29 (27.4)	282 (17.0)
They would not accept it.	9 (8.5)	105 (6.3)
They would be happy.	9 (8.5)	100 (6.0)
They would not mind.	3 (2.8)	55 (3.3)
I do not know how they would react.	1 (0.9)	42 (2.5)

Figure 2.40.: The answer categories one to eight were randomized. More than one of these answer categories could be chosen. If the last question was chosen, no other answer was possible. The numbers in brackets are percentages. There are no missing values and the median is the choosing of three answers (n=671).

How would you assess yourself: Are you in general a risky person or do you try to avoid risks?
On a ten-stage scale means a cross on the very left side 'not risky at all' and on the very right side 'very risky'. In between there are gradations.

	1	2	3	4	5	6	7	8	9	10
CE-users	1	6	8	14	7	12	23	20	12	3
(n=106)	(0.9)	(5.7)	(7.5)	(13.2)	(6.6)	(11.3)	(21.7)	(18.9)	(11.3)	(2.8)
CE-nonusers	27	131	324	232	181	279	253	172	48	12
(n=1659)	(1.6)	(7.9)	(19.5)	(14.0)	(10.9)	(16.8)	(15.3)	(10.4)	(2.9)	(0.7)

Figure 2.41.: The answer categories were not randomized. Only one answer category could be chosen. The numbers in brackets are percentages. There are no missing values.

From where did you learn about this survey? (multiple answers possible)

	n_{Total}=1765
I received an e-mail from the University of Zurich ('Rechtsdienst')	1205 (68.3)
I received an e-mail from a student union or via a mailing list of a study subject.	291 (16.5)
I received a flyer.	195 (11.0)
A lecturer mentioned the survey.	77 (4.4)
I received a personal e-mail.	77 (4.4)
'open answer'	32 (1.8)

Figure 2.42.: The answer categories were not randomized. More than one of these answer categories could be chosen. The numbers in brackets are percentages. There is one missing value and the median is the choosing of one answer (n=1670).

2.4 Hypotheses

The following hypotheses were formulated while constructing the questionnaire. As mentioned in the publication, they were established on the basis of previous studies about the usage of CE as well as proposed, possible associations concerning the usage of CE. If H0 was rejected, the information was included into the publication.

If the p-value of the χ^2-test was smaller than 0.05, the hypothesis H0 was rejected. In this case, an association was found (for defining if such an association is a cause or an effect, a longitudinal study would have to be accomplished).
A requirement for the performance of such a χ^2-test was that the sampling distribution has to have an approximate χ^2 distribution. If more than 20% of the expected values were smaller than 5 or any expected value smaller than 1, this is not given anymore and the test looses statistical power meaning that the test may fail to detect an effect [110]. In such cases, the Fisher's test had to be used.

If the p-value of the χ^2-test was smaller than 0.05 respectively the p-value of the Fisher's test, H0 was rejected. In such cases are the accepted hypotheses in the following highlighted in green. Otherwise, 'H0' is coloured in yellow.

Part 1 and CE-users vs. CE-non-users
1. Gender (χ^2-test p=.000; 0<5)
H0: Around as many men as women are taking CE.
H1: More men are taking CE.
H2: More women are taking CE.

2. Age (χ^2-test: p=.995; 74<5 (66.1%); Fisher's test: 1.000)
H0: The use of CE is independent of the age.
H1: Younger students are more often taking CE.
H2: Older students are more often taking CE.

3.a Major subject: 'Student group' (χ^2-test: p=.031; 3<5 (37.5%); Fisher's test: 1.000)
H0: The use of CE is independent of the study subject.
H1: Students of particular study subjects are more often taking CE.

3.b Major subject: 'Which faculty' (χ^2-test: p=.092; 5<5 (22.7%))
H0: The use of CE is independent of the faculty.
H1: Students of particular study subjects are more often taking CE.

4. Semester (χ^2-test: p=.816; 29<5 (53.7%))
H0: The use of CE is independent of the number of semesters.
H1: The more semesters one student was at University, the higher the chance of taking CE.
H2: The less semesters one student was at University, the higher the chance of taking CE.

5.a Education of the mother (χ^2-test: p=.419; 2<5 (12.5%))
H0: The use of CE is independent of the education of the mother.
H1: Students with mothers with a higher education take more often CE (higher social pressure to gain a similar education?)
H2: Students with mothers with a lower education take more often CE

5.b Education of the father (χ^2-test: p=.828; 6<5 (33.3%))
H0: The use of CE is independent of the education of the father.
H1: Students with fathers with a higher education take more often CE.
H2: Students with fathers with a lower education take more often CE.

6. Student union (χ^2-test: p=.260; 1<5 (16.7%))
H0: The use of CE is independent of the activity in student unions.
H1: Students being active in the student union take more often CE.
H2: Students being not active in the student union take more often CE.

7. Student fraternities (χ^2-test: p=.414; 1<5 (16.7%))
(If answer: 'I do not know' → missing value: χ=1.676; df=2; p=.195; 0<5))
H0: The use of CE is independent of the activity in student fraternities.
H1: Students being active in student fraternities take more often CE.
H2: Students being not active in student fraternities take more often CE.

8.a Average marks (0 and 'hard to say?' → missing values): χ^2-test: p=.005; 4<5 (28.6%), Fisher's test: 1.000)
If: 2.5-4.4 and 4.5-6.0: (χ=2.054; df=1; p=.152; 1<5)
H0: The use of CE is independent of the average marks.
H1: Students with lower marks are more often taking CE.
H2: Students with higher marks are more often taking CE.

8.b Categories of marks (df=1; x<5, x>20% → Fisher's test: p: .15-.920 (Phil1: .115))
H0: The average mark and the faculty do not correlate.
H1: The average mark is for some faculties higher then for others.

9. Housing form (χ^2-test: p=.186; 2<5 (14.3%))
H0: The use of CE is independent of the housing form.
H1: Students, who are living in a shared flat or a student house, take more often CE.

10. Politics (χ^2-test: p=.042; 0<5)
H0: The use of CE is independent of the political position.
H1: Students with certain political positions take more often CE.

10.b Politics and activity (out of curiosity= (χ^2-test: p=.001; 8<5 (33.3%); Fisher's test: 1.000)
H0: Students active in the student union show the same distribution of political positions as the non-active students.
H1: Students with a 'left' political position are more often active in the student union.

11.a Religion (χ^2-test: p=.001; 4<5 (28.6%); Fisher's test: 1.000)
H0: The use of CE is independent of the religion.
H1: Religious students take less often CE.

11.b combined categories of religion: Evangelic reformed, Roman Catholic, others, none.
Religion (χ^2-test: p=.004; 0<5)
H0: The use of CE is independent of the religion.
H1: Religious students take less often CE.

12. Importance of religion (χ^2-test: p=.003; 0<5)
H0: The use of CE is independent of the importance of religion.
H1: Students for who relgion is more important take less often CE.

13. Money (χ^2-test: p=.062; 2<5 (14.3%), Fisher's test: 1.000)
H0: The use of CE is independent of the money.
H1: Student who have more money per month take more often CE.

14. Income of the family (χ^2-test: p=.198; 1<5 (12.5%), Fisher's test: 1.000)
H0: The use of CE is independent of the income of the family.
H1: Students from richer families take more often CE.

Part 2 and CE-users vs. CE-non-users
15. Coffee and others
15.a Coffee (χ^2-test: p=.004, 0<5)
H0: The use of CE is independent of the use of coffee.
H1: Consumers take more often CE.
H2: Non-consumers take more often CE.

15.b Red-Bull (χ^2-test: p=.000, 0<5)
H0: The use of CE is independent of the use of Red-Bull.
H1: Consumers take more often CE.
H2: Non-consumers take more often CE.

15.c Grape sugar (χ^2-test: p=.130, 0<5)
H0: The use of CE is independent of the use of grape sugar.
H1: Consumers take more often CE.

H2: Non-consumers take more often CE.

15.d Guarana (χ^2-test: p=.000, 0<5)
H0: The use of CE is independent of the use of Guarana.
H1: Consumers take more often CE.
H2: Non-consumers take more often CE.

15.e Khat (χ^2-test: p=.716, 2<5 (50%))
H0: The use of CE is independent of the use of khat.
H1: Consumers take more often CE.
H2: Non-consumers take more often CE.

15.f Black tea (χ^2-test: p=.826, 0<5)
H0: The use of CE is independent of the use of black tea.
H1: Consumers take more often CE.
H2: Non-consumers take more often CE.

15.g Coca Cola (χ^2-test: p=.890, 0<5)
H0: The use of CE is independent of the use of Coca Cola.
H1: Consumers take more often CE.
H2: Non-consumers take more often CE.

15.h Cigarettes (χ^2-test: p=.000, 0<5)
H0: The use of CE is independent of the use of cigarettes.
H1: Consumers take more often CE.
H2: Non-consumers take more often CE.

15.i 'Nothing taken' (χ^2-test: p=.007, 0<5)
H0: The use of CE is independent of the use of.
H1: Students who chose answer 'nothing taken' take more often CE.
H2: Students who chose answer 'nothing taken' take more often CE.

16 Meditation and others
16.a Sport (χ^2-test: p=.264, 0<5)
H0: The use of CE is independent of sport.
H1: Consumers take more often CE.
H2: Non-consumers take more often CE.

16.b Stretching (χ^2-test: p=.788, 0<5)
H0: The use of CE is independent of stretching.
H1: Consumers take more often CE.
H2: Non-consumers take more often CE.

16.c Yoga (χ^2-test: p=.239, 0<5)
H0: The use of CE is independent of yoga.
H1: Consumers take more often CE.
H2: Non-consumers take more often CE.

16.d Walking (χ^2-test: p=.298, 0<5)
H0: The use of CE is independent of walking.
H1: Consumers take more often CE.
H2: Non-consumers take more often CE.

16.e Learning pauses (χ^2-test: p=.279, 0<5)
H0: The use of CE is independent of learning pauses.
H1: Consumers take more often CE.
H2: Non-consumers take more often CE.

16.f Autogenic training (χ^2-test: p=.009, 1<5 (25-0%), Fisher's test: .017)
H0: The use of CE is independent of autogenic training.
H1: Consumers take more often CE.
H2: Non-consumers take more often CE.

16. g 'no specific activities' (χ^2-test: p=.436, 0<5)
H0: The use of CE is independent of.
H1: Students who chose answer 'no specific activities' take more often CE.
H2: Students who chose answer 'no specific activities' take more often CE.

Part 2-separated questions between CE-users and CE-non-users
17. Known NEPs. (χ^2-test: p=.000 for all three CE)
H0: The use of CE is independent of the knowledge about CE.
H1: Consumers know of more CE.
H2: Non-consumers know of more CE.

18. Recommendations for the use of CE (χ^2-test: p<0.001, 0<5)
H0: No differences between CE-users and CE-non-users.
H1: CE-users have received more recommendations for the use of CE.

19. Why CE
H0: No difference in the order of the answer items between CE-users and CE-non-users.
H1: There is a difference.

20. Number of concerns (χ^2-test: p=.000, 0<5)
(Calculated with category 'BedAll_Anzahl' = expected values below 1 → Fisher's test: 1.000. But because of high df, beta-error is likely → generated new cateogory: BedAll_Anz_Kat)
H0: No difference between the number of concerns of CE-users compared to CE-non-users.
H1: The CE-non-users agree to more concerns than the CE-users.

21. Selection of the concerns ('I do not know → vmissing value; p=.000 for all concerns expect for 'God': p=.014).
H0: No differences were found in the selection of concerns between CE-users and CE-non-users.
H1: There exists a difference between CE-users and CE-non-users.

22. CE as an illness and frequency. (Only reasonable for Ritalin, for the others: n is too small!, p=.334, 3<5 (37.5%), Fisher's test: 1.000)
H0: Students who have received CE for a treatment of an illness, do not more often take is as a CE.
H1: Students who have received CE for a treatment of an illness, take it more often as a CE.

23. Number of students who are taking CE (χ^2-test: p=.311)
H0: There is no difference found compared to the study done in the US.
H1: Less students of this survey take CE compared to the survey in the US.
H2: More students take CE in this survey.

Part 2-together
24.a Side effects (0 and 'I do not know the product enough' = missing values)
Ritalin: χ^2-test: p=.000, 0<5; Adderall®: 6<5 (42.9%), Fisher's test: 1.000; Modasomil®: 6<5 (42.9%), Fisher's test: 1.000)
H0: No differences were found between CE-users and CE-non-users (for Adderall®und Modasomil®).
H1: Students who are taking CE estimate the side effects as less critical. (for Ritalin)
H2: Studetns who are taking CE estimate the side effects as more critical.
nonusers[.4cm] 24.b x taken: yes/ no and side effects (Ritalin: χ^2-test: p=.000, 1<5 (8.3%); Adderall®: p=.000, 6<5 (50.5%) → Fisher's test: 1.000; Modasomil®: p=.000, 5<5 (41.7%) → Fisher's test: 1.000)
H0: No differences were found between the estimation of side effects of CE-users when comparing their used product and other CE. (Adderall®, Modasomil®)
H1: Person who have taken a CE, to estimate the side effects of the used CE as less critical than the side effects of other CE. (Ritalin)

25. Formation of the opinion about the side effects (sig. for 'specialist literature', for 'friends who are taking it' and for 'friends who are not taking it')
H0: No differences were found between CE-users and CE-non-users.
H1: There exists a difference between CE-users and CE-non-users.

26.a Drug consumption (χ^2-test: p=.000-.039, if x<5: x>0 → Fisher's exact test)
H0: No differences were found between CE-users and CE-non-users.
H1: More CE-users have taken drugs compared to the CE-non-users.

26.b Why have drugs been consumed (χ^2-test: significant for alertness (.000*), mood (.001), concentration (.000*), use of others (.040), performance (.000*), feeling (.005); *=Fisher's test p-value)
H0: No differences were found between CE-users and CE-non-users.
H1: There exists a difference between CE-users and CE-non-users concerning the resons for taking drugs.

27. Alcohol consumption (χ^2-test: p=.224; 3<5 (21.4%) → Fisher's test: 1.000)
H0: No differences were found between CE-users and CE-non-users.
H1: More of the CE-users are drinking more often alcohol then the CE-non-users.

Part 3
28.a Ritalin®and Anabolics and CE-users vs. CE-non-users (For Ritalin®as well as for Anabolics: χ^2-test: p=.000, 1<5 = 12.5%)
H0: No differences were found between CE-users and CE-non-users.
H1: CE-users were more often answering that such a usage of Ritalin®as well as Anabolics is fine for them.

28.b Ritalin®and Anabolics (χ^2-test: p<.001)
H0: No differences were found between the estimation of the case study about Ritalin®when comparing to the one Anabolics.
H1: More of the students find the case study about Anabolics fine compared to the one about Ritalin.
H2: More of the students find the case study about Ritalin®fine compared to the one about anabolics.

29.a 65 years old person and CE-users vs. CE-non-users (χ^2-test: p=.000; 0<5)
H0: No differences were found between CE-users and CE-non-users.
H1: CE-users find it more often fine.

29.b Comparison and CE-users vs. CE-non-users (χ^2-test: p=.003; 0<5)
H0: No differences were found between CE-users and CE-non-users.
H1: CE-users find it more often the same.
H2: CE-non-users find it more often the same.

29.c 25 and 65 years old person (χ^2-test: p<.001)
H0: Most of the students find these two cases the same.
H1: The students find the use of the 65 year old person more often fine.

29.d Reaction of CE-non-users and 25 years old person to increase concentration (40.0% (n=6) of person with reaction: 'Yes, that is fine for me' → fine in cast study. 64.7% (n=729) of students with reaction: 'no, I am not fine with that' → , not fine in case study. Internet: 6,1,5,72, problem: too small numbers for χ^2-test)
H0: No correlation between the rating of others and the case study.
H1: There is a positive correlation between the answers to these two questions.

30. Normality (χ^2-test: p=.000; 0<5)
H0: No differences were found between CE-users and CE-non-users.
H1: More of the CE-users do think it will be normal in ten years to use CE.

31.a Coffee and Ritalin® in exams (coffee: χ^2-test: p=.102; 2<5 (33.3%), Fisher's test: 1.000; Ritalin: p=.000, 0<5)
H0: No differences were found between CE-users and CE-non-users.
H1: More of the CE-users find Ritalin® acceptable.

31.b Coffee and Ritalin® in exams (Chi-quadrat test: p<0.001)
H0: No differences were found looking at all students between coffee and Ritalin.
H1: Less students accept Ritalin® than coffee.
H2: Less students accept coffee than Ritalin.

31.c answer 'no' in question about acceptance of Ritalin® in exams and the two answers 'no?' in question if one could imagine to take CE. H0: No correlation between these answers. H1: Both 'no' answers about imaging a use of CE find the use of Ritalin® more often inacceptable.
H2: Only more of the student who chose the strict no-answer find the use of Ritalin® more often inacceptable. (79.8%:50.5%)

31.d Rating of Ritalin-use in exams and rating of a use by the CE-non-users (χ^2-test: p=.000; 2<5 (16.7%), Fisher's test: 1.000)
H0: Most of the students do show no difference between the general rating of CE and the rating of a use of Ritalin® in this combined question with coffee.
H1: Most of the students refuse a use of Ritalin® less strongly in this combined question with coffee than in the general question about a usage of CE.

32.a Product to increase of IQ and CE-users vs. CE-non-users (χ^2-test: p=.000; 0<5)
H0: No differences were found between CE-users and CE-non-users.
H1: More of the CE-users would use such a product.

32.b. Product to increase of IQ and gender (χ^2-test: p=.000; 0<5, =in line with hypothesis 1)
H0: No differences were found between men and women.
H1: More men would take such a product compared to women.

33. Parents for trying to evaluate an aspect of social pressure
(Higher value for CE-users: 'That I study is very important for them' (χ^2-test: p=.006, 0<5) and a tendency for 'they would be disappointed' (p=.087, 0<5). But no correlation for 'they would not accept it' (p=.376, 0<5).
H0: No differences were found between CE-users and CE-non-users.
H1: More of the CE-users chose the categories which show some social pressure from the parents ('not acceptable', 'very important to study' and perhaps 'would be disappointed').

H2: There are differences but not specifically for the answers about social pressure.

34. Self-evaluation of handling with risk (χ^2-test: p=.000; 3<5 (15.0, x=0.90 → fisher's test: 1.000))
H0: No differences were found between CE-users and CE-non-users.
H1: More of the CE-users say that they are riskier than most of the CE-non-users.

35.a. Number of reasons vs. CE-users and CE-non-users (χ^2-test: p=.000, 1<5 (10.0%))
H0: No differences were found between CE-users and CE-non-users.
H1: The CE-users agree to more reasons than the CE-non-users.

35.b Reasons vs. CE-users and CE-non-users (χ^2-test: p=.000 expect for 'respect' and 'prevention': p=.010; for all reasons: 0<5).
H0: No differences were found between CE-users and CE-non-users.
H1: There are differences between the CE-users and the CE-non-users.

The information of these 35 hypotheses were included in the publication if H0 was rejected. Additional hypotheses were formulated about possible correlations between the question about concerns respectively about reasons to take CE and other questions. These analyses revealed for the question about concerns for all participants that: Women agreed to more concerns than men, students who answered 'no affiliation' in the question about religion (Figure 2.6) agreed to a fewer concerns and correlations between the political view (Figure 2.5) and the selection of the concerns were found. The highest values of agreement to the concern about not being oneself anymore was found for CVP and GPS, to the concern about the goal of CE to achieve more for the parties 'Others', SP and GPS, and to the concern about God for the parties SVP and CVP. Students of the non-users who have chosen the negative answers when asked if they could imaging to take CE (Figure 2.26) agreed to more concerns than the other non-users.
When focusing on the question about reasons for using CE, the analyses revealed that: Older students agreed less often to reasons than younger students and more students sharing the political view of SP and FDP agreed to the reason about finishing more work in less time compared to the percentage values of other political parties.

2.5 Conclusion

The survey among 1765 students of the University of Zurich revealed that 4.7% of the participants have taken CE for study purposes. These students have taken Ritalin®, Adderall®and/or Modasomil®at least once in their life to increase their concentration and/ or alertness as a healthy person. As seen in the discussion section of the paper, these findings are in line with previous studies, especially with those surveys accomplished in Germany (see table 1.2, page 21). A closer comparison with the very recent study done by Larissa Maier and her colleagues is of interest because it has been accomplished among a very similar population in Switzerland [74]. In her study, 13.8% of the participants had experiences with CE. CE was defined as the following: The usage of prescription drugs or drugs of abuse including alcohol to directly or indirectly enhance brain function (e.g. concentration, alertness, and a reduction of nervousness). 13.8% of the participants have at least once in their life taken such CE. When focusing only on prescription drugs, 7.6% of the participants have taken them as CE. In this group are the following products included: methylphenidate, modafinil, antidepressants, antidementia drugs, sedatives and beta-blockers. When focusing on the numbers of each of these products, comparisons with our study are possible. For methylphenidate, the life time prevalence as a CE was 4.1% and for Modafinil®0.3% in the study of Maier [74]. In our survey among students, 4.7% of the participants have taken Ritalin®, Adderall®or Modasomil®as a CE for study purposes. This number is not significantly different from 4.1% (if all modafinil users have also taken Ritalin®: p-value: 0.209) nor from 4.4% (Ritalin®- and modafinil-users are different participants: p-value: 0.561). These numbers of the study of Larissa Maier and her colleagues are significantly different from 6.2% standing for all the participants in our study who have taken CE for non-therapeutic use. But there are also 27 additional students included who took it out of curiosity or as a 'party drug'. Such students are most probably all excluded in the definition of Larissa Maier and her colleagues where the enhancement of brain functions was explicitly mentioned in the given definition of CE.
Both of these surveys accomplished among students in Switzerland are not representative. This is because the link of the survey was not sent out to all students or, more realistic, to a sample that was weighted to construct a representative sample, but rather to a sample which was constructed of all students, who allow the University to share their email address for such purposes. Therefore, having now our survey in comparison with the survey of Larissa Maier and colleagues and also with our small paper-and-pencil survey resulting in similar results, there is most probably no significant bias in our surveys influencing the number of CE-users.

Specific to our survey was the focus on personal attitudes about CE to evaluate the rating of arguments coming form the discussion in the field of ethics. We have asked questions about reasons and concerns about the usage of CE, presented three case studies about young and old person taking steroids or Ritalin®, and asked if they think such a usage is right or wrong, if the participants think it will be normal to take such CE in

10 years and if they would take such a CE if it would have no side effects at all (for the results, please see section 2.2. or in more details: subsection 2.4.3). Larissa Maier and her colleagues asked also a few questions about the personal attitudes presenting different arguments for or against neuroenhancement but no information about how these arguments were selected was available in the publication.

Taken together, our survey provides the first data about students in Switzerland concerning the usage and handling of CE of users in comparison with non-users as well as their personal attitudes about such products. Having now set a starting point of evaluating empirical data concerning CE in Switzerland, further methods could be used to overcome possible limitations of quantitative surveys, e.g. with the help of qualitative interviews, personal attitudes could be evaluated in more details.

3 Survey among Physicians

3.1 Introduction

The Swiss Academy of Medical Sciences (SAMW) has been working on human enhancement for some time (Section 1.7). After the SAMW held a conference on human enhancement in 2007, they defined this topic as a core area in 2008. Under the direction of Prof. Nikola Biller-Andorno, a working group was established to focus on human enhancement from 2008 until 2012 in coordination with the Centre for Technology Assessment (TA-Swiss) and the Swiss Advisory Commission on Biomedical Ethics in the field of human medicine (NEK-CNE). The working group looked in particular at the role of medicine concerning the topic of human enhancement. The working group authorized the Institute of Biomedical Ethics of the University of Zurich to accomplish a paper-and-pencil survey among general practitioners and psychiatrists in Switzerland. The recommendations of the working group are included in the last chapter of the information booklet on 'Medizin für Gesunde? Analysen und Empfehlungen zum Umgang mit Human Enhancement' (for more information, please see chapter 4).

Rachel Neuhaus Bühler and Nicole Miller developed together with Nikola Biller-Andorno a questionnaire after conduction eight qualitative, half-standardised interviews with psychiatrists and general practitioners in the region of Zurich and defined the sample containing of 1600 Swiss practicing physicians. In summer 2011, I was involved in this project by conducting the pre-test. After integrating the recommendations, I sent out the questionnaire twice to the pre-defined sample of 1600 Swiss practicing psychiatrists and general practitioners (800 from the German and 800 from the French speaking part of Switzerland). The core centre of the questionnaire consists of four case scenarios of different people asking their physician for a cognitive enhancer (in details explained in the method section of the publication in 2.2). 379 physicians completed the questionnaire (response rate 24.7%) and their answers are presented in the publication in the following section and will be briefly summarized in the conclusion section in 3.3.

3.2 Publication

The paper on the survey among physicians was published in the journal 'Swiss Medical Weekly' in November 2012. A print of the publication is included in this section.

Established in 1871
Swiss Medical Weekly
Formerly: Schweizerische Medizinische Wochenschrift
The European Journal of Medical Sciences

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Neuroenhancement – perspectives of Swiss psychiatrists and general practitioners

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Summary

QUESTIONS UNDER STUDY: Although the ethical and health implications of neuroenhancement have been intensely discussed over the past years, little is known about the experiences and attitudes of physicians confronted with requests for neuroenhancing substances. The aim of this study was to explore general practitioners' and psychiatrists' familiarity with such requests and their willingness to prescribe these products.

METHOD: A nation-wide cross-sectional survey among general practitioners and psychiatrists in Switzerland was conducted. A questionnaire was developed, pre-tested and sent out to a pre-defined sample of 1,600 Swiss practising physicians in the fields of psychiatry and general practice/internal medicine in the German-speaking and French-speaking part of Switzerland.

RESULTS: A total of 393 questionnaires were returned (response rate: 24.7%). 80.2% of study participants were encountered requests for neuroenhancing products in their own practice, mostly not exceeding 1–2 times a year. A total of 41.1% were undecided when asked if they categorically against neuroenhancement, 49% would decide on a case-by-case basis, and 9.6% would decide according to patients' wishes.

CONCLUSIONS: Swiss psychiatrists and general practitioners are confronted with requests for neuroenhancement, albeit not very frequently. Most participants embrace a pragmatic position towards neuroenhancement, although there is also a considerable degree of uncertainty about the appropriateness of a categorical refusal. A minority would follow a consumer model that leaves the decision about the use of neuroenhancers to the client, even though this conflicts with legal requirements regarding drug prescriptions.

Key words: *neuroenhancement; ethics; survey; physicians; attitudes*

Introduction

Neuroenhancement – in the sense of improving cognitive and emotional capacities through pharmacological substances in healthy humans – is an intensely discussed topic in medical ethics [1–5]. Issues at stake in the debate about neuroenhancement (NE) are the autonomy of users and the moral impetus to develop our full human potential versus concerns about justice, solidarity in an increasingly competitive and demanding society, and safety. The latter is of particular concern given that long-term side effects of available putative neuroenhancers such as methylphenidate and modafinil have not yet been investigated in healthy humans [1].

At the same time there are few empirical data on (potential) users [6–10] and even less on (potential) providers [4, 11, 12]. Some recent studies have investigated the perspectives of physicians from the US [4] and from Canada and the US [12], but to date there are no corresponding data on Switzerland. Although it is often claimed in the media that there is an epidemic of neuroenhancing drug use, we do not know how frequently physicians actually encounter such requests and how they deal with them. Certainly not all neuroenhancers will be obtained through physicians. Still, taking into account the perceptions and perspectives of physicians, who are potentially confronted with requests for neuroenhancers in their daily work and who need to make decisions on whether or not to prescribe the respective drug, is of key relevance to a debate that is not supposed to be purely theoretical but based on clinical realities.

The aim of this study was to explore general practitioners' and psychiatrists' attitudes towards NE, their familiarity with requests for such products as well as their willingness to prescribe them.

Methods

Development of the questionnaire

In preparation of the questionnaire eight qualitative, half-standardised interviews were conducted. Four practising psychiatrists and four general practitioners in the region of Zurich were interviewed. The interviews aimed to obtain a sense of the degree of physicians' familiarity with NE and to explore ways to frame items and possible answers so that they would make sense to participants. The interviews were transcribed and analysed with the Software MaxQda2 for Windows programme (Berlin-Marburg-Amöneburg, Germany; see www.maxqda.com), using the method of inductive formation of categories according to Mayring [13]. The results were incorporated into the development of items for the pilot questionnaire, which was sent to 48 randomly se-

lected persons from the main sample. The feedback and the results of the ten returned questionnaires (20.8%) were used to produce the final version of the questionnaire.
The procedures of the survey were in accordance with the ethical standards of a research ethics committee and with the Helsinki declaration.

Questionnaire

The questionnaire starts with demographic data as well as questions about the term "neuroenhancement" (the German or French questionnaires can be made available by the authors upon request). The following items address participants' concepts of disease and treatment. After these initial questions a definition of the term "neuroenhancement" is presented, to which the remainder of the questionnaire refers: "Neuroenhancement stands for the improvement ('optimisation') of cognitive and emotional abilities of healthy humans through pharmacological substances. The most discussed substances are methylphenidate (Ritalin©), modafinil (Modasomil©, Provigil©), antidepressants and anti-dementia drugs, although with different clinical effectiveness [7, 14]. There are also some additional substances, which are potential therapeutic agents for diseases, and which are still in the experimental phase." The subsequent part of the questionnaire contains four case scenarios, which were chosen to represent clinically relevant requests for the most frequently used neuroenhancing products:

1. A student will soon take his two last and decisive exams. If he is successful, he will obtain his degree and a well-paid position. If not, he cannot proceed with his studies and will have to leave the university. He has already had to repeat some exams, due to difficult personal circumstances. After a time of intense exam preparations, he asks his doctor for a drug to diminish his need for sleep so that he can use the scarce remaining time as efficiently as possible.

2. For several weeks, a single mother-of-two has cared for her terminally ill mother at home and has become completely exhausted. However, she does not want to place her mother in a care institution because she expects that she will not live much longer. The mother had supported her during her divorce and she would like to return the favour. She asks her physician for a stimulant so she can keep up with her workload for a longer time.

3. A 24 year-old woman, who is shy and has low self-esteem around men wants to get rid of her inhibitions. She asks her physician for a drug that can reduce her anxiety. A female friend of hers is taking a drug for social phobia, and she would also like to try this drug.

4. A renowned scientist, who has just come back from a business trip, is suffering from jet lag and wants a prescription for modafinil as he wants to be back at his normal performance level as soon as possible, as he is attending a conference in the near future. He asks his family doctor to prescribe an appropriate stimulant.

The case scenarios are followed by questions about whether the participants have encountered such situations and, if so, about how they handled them, or, if not, would handle them. The remaining questions explored their personal attitudes to NE and their knowledge about the possible side effects of certain neuroenhancers. These cases do not merely capture medical aspects, but contain strong psychosocial components with a kind of "moral appeal" to the (imaginary) treating physician.

Sample

The questionnaire was designed to provide insights into the attitudes, routine practice and knowledge that practising physicians have of NE. Psychiatry and general practice were chosen as the specialities which would have the largest number of requests for neuroenhancers, as it is within these specialities that Ritalin© (methylphenidate), a key substance in the neuroenhancement debate, is mostly prescribed [15]. Differences that could be correlated to gender, speciality, clinical experience and language (German/French) were of interest to the analysis. As requested by the working group "Human Enhancement" of the Swiss Academies of Sciences, which had commissioned the study, the sample size was constructed with an equal distribution of all independent variables in order to facilitate such comparisons and at the same time keep it as small as possible. According to Bortz the preconditions of a variance analysis, like a normal distribution or the demand of a homogeneous sample variance, can be neglected if the subgroups contain more than ten members [16]. The sample was defined in such a way as to include 100 persons for each of the 16 combinations of gender (male, female), specialist training (psychiatrist, GP and others), number of working years (1–10, >10) and language (German, French).
The survey was conducted between July and October 2011. The questionnaire was sent out twice to 1600 Swiss practising physicians in the fields of psychiatry and general practice/internal medicine. Addresses were obtained through the Swiss Medical Association (Foederatio Medicorum Helveticorum). With the second mailing, a book voucher (20 CHF) was offered to those considering participation in the study. A total of 800 of the addressees were in the French part of Switzerland, while the other half were located in the German-speaking part of Switzerland. Due to relocation the number of persons who were reached by mailing was reduced to 1589.
To eliminate double participation, a specific code was assigned to each participant, containing the first two letters of their first and last names and their date of birth.

Analysis

Analyses were performed using SPSS version 19 for Mac. We used univariate descriptive statistics to examine the distribution for the items of each question. Next to that were cross tables generated to identify the responses of the physicians in more than one questionnaire. Pearson's chi-square was performed to test if the distributions among the items were significantly different or, in relation to cross tables, whether there was a relationship between two categorical variables ($p < 0.05$). Cramer's V was performed to test the strength of association between two categorical variables [17]. Subgroup analyses including Pearson's chi-square revealed if different responses were given according to language (German/French), gender, speciality (psychiatry/general practice) and work experience (0–10 years / >10 years).

Results

A total of 393 questionnaires were returned (response rate 24.7%). 14 questionnaires had to be removed either because of the large amount of missing values (n = 4) or because they were likely to have been sent in twice by participants after the reminder (n = 10), leaving 379 questionnaires for the analysis (23.9%).

In the sample, 196 persons (52.1%) were male and 180 (47.9%) were female (n_{Total} = 376). The average year of birth was 1953, with a range from 1942–1979. After the first mailing, 155 questionnaires from German speakers and 99 questionnaires from French speakers were returned (67.0%; n_{Total} = 379). After the second mailing, an additional 64 German and 61 French questionnaires were received. Of these 125 persons who responded to the second mailing, 62 asked for the book voucher. This means that only half of the participants (49.6%) to whom a book voucher was offered took advantage of this offer.

In the sample, 208 persons specialised in "psychiatry and psychotherapy", 116 in "general medicine", 65 in "internal medicine" and a total of four persons had another speciality title. A total of 19 persons specialised in two fields (n_{Total} = 374). On average, participants had been working for 14.8 years in private practice (standard deviation: 9.7, n_{Total} = 362). The work environment was 'rather rural' for 32.7% of the physicians and "rather urban" for 67.3% (n_{Total} = 370).

Knowledge of term and immediate response

Regarding the question "Do you know the term neuroenhancement?", the majority of the respondents chose the answer "no" (68.9%, n_{Total} = 376). The term "brain doping" was better known among the participants and 53.6% of the respondents indicated that they knew this term (n_{Total} = 371).

Table 1 shows the responses of participants confronted with five statements about media reports on the increasing use of performance-enhancing products among students and employees.

All five statements were chosen by more than 50% of the sample. However, only eight of the participants affirmed all five statements and relatively high values were documented in the category "undecided".

Concepts of disease and treatment

When asked which criteria participants would use for determining whether a dysfunction should be considered a disease, "subjective suffering" was the most frequently chosen criterion, followed by "negative consequences for everyday ability to work" (table 2).

When asked how they would decide if a patient asked for a prescription without an indication, the majority of the participants (67.0%, n = 250; n_{Total} = 373) chose the answer: "In general, I do not prescribe anything without an indication. However, if subjective suffering is strong and the patient wants to try whatever is possible, I might prescribe something without a clear indication. This depends on the substance and its contraindications and undesired side effects." A total of 28.4% of the participants (n = 106) answered: "Without indication I do not prescribe anything." Only a minority of the participants (4.6%, n = 17) chose to reply: "I inform the patient concerning the possible risks of a desired drug and when she/he still wants it, she/he should be free to try it."

In the question about which medication participants would prescribe without a clear indication, in response to a patient's request, antidepressants were chosen from a list with 11 items by 13.3%, ranking fifth after NSAIDs (21.6%), Viagra (20.3%), laxatives (17.6%) and benzodiazepines (13.6%). The other six options (neuroleptic drugs (5.5%), antibiotics (4.9%), opioids (1.9%) and three potential neuroenhancers – anti-dementia drugs (5.0%), methylphenidate (2.5%) and modafinil (2.0%)) – were only chosen by a small minority.

The case scenarios

Participants were confronted with the four case scenarios described above. The introduction of each scenario was followed by questions about which substances they would

Table 1: Which of the following statements come(s) closest to your own spontaneous reaction to the increasing use of performance enhancing drugs (multiple answers possible)?

	Yes, *n* (%)	No, *n* (%)	Undecided, *n* (%)	n_{Total}
Hardly surprising that this is happening when demands and competitive pressure continue to rise.	**228 (62.5)**	66 (18.1)	71 (19.5)	365
One should put a stop to these things.	**183 (51.8)**	57 (16.1)	113 (32.0)	353
Everybody is responsible for his/her own actions.	**212 (58.6)**	68 (18.8)	82 (22.7)	362
People have always tried to improve their performance. Coffee and Red Bull are already around, it's just that the range of possibilities is increasing.	**234 (65.0)**	62 (17.2)	64 (17.8)	360
This is as wrong as doping in sports.	**194 (53.7)**	90 (24.9)	77 (21.3)	361
The highest value for each criterion is in bold letters. The numbers of the three answer categories differ significantly for all five reactions (p = 0.000).				

Table 2: When you have to decide whether a dysfunction has disease value – what criteria are decisive for you (multiple answers possible)?

	Yes, *n* (%)	No, *n* (%)	Sometimes, *n* (%)	n_{Total}
Subjective suffering	**317 (83.6)**	8 (2.1)	50 (13.2)	375
Classification according to ICD / DSM)	**165 (43.5)**	93 (24.5)	100 (26.4)	358
Objectification with laboratory / visual methods	**165 (43.5)**	70 (18.5)	117 (30.9)	352
Negative consequences for everyday ability to work	**290 (76.5)**	11 (2.9)	65 (17.2)	366
The highest value for each criterion is in bold letters. The numbers of the three answer categories differ significantly for all four criteria (p = 0.000).				

prescribe (if any) and if they had received such requests in their clinical practice.

As answers to the first question, about how participants would act, four statements were offered (table 3). The statement – "I would only prescribe drugs if psychotherapeutic methods or comparable measures were not helpful enough" – was the most popular overall. It was endorsed by most of the participants for the third case scenario concerning the shy woman and had least support in the case of the renowned scientist asking for modafinil.

The statement: "I would prescribe a drug like Ritalin©, Modasomil©, antidepressants or anti-dementia drugs" was rejected by the majority of participants. However about one third would hand out a prescription to the shy woman and about a quarter to the single mother. Opinions were divided about the statement; "I principally prescribe no drugs in such situations"; it had least support in the case of the single mother and the shy woman. The statement – "I do not prescribe drugs in such situations, but refer to the possibility that the patient could consult some of my other colleagues or order via the Internet" – was overwhelmingly rejected by participants.

Most of the participants who would prescribe a drug in the first scenario chose beta blockers (table 4), followed by antidepressants and Ritalin© (methylphenidate). In the second and third case scenarios, the majority chose antidepressants. Modasomil© (modafinil) was selected by most of the participants who would prescribe a drug in the fourth case scenario. Overall, antidepressants were by far the most frequently chosen drugs.

The next question turned from hypothetical questions to an exploration of whether participants had in fact been confronted with requests for enhancing products in their clinical practice (table 5).

Whereas the "student" and the "shy woman" had been encountered by about half of participants, slightly fewer participants had been confronted with the single mother case and only about one fifth with the renowned scientist scenario. 10.0% of the participants (n = 32) knew all scenarios, in contrast to 19.8% who had not experienced any of them (n = 63). The subgroup analysis according to work environments showed that the "shy woman" scenario had been experienced by 23.7% of participants with a "rather rural" surrounding, compared to 76.3% of those practising in a "rather urban" setting ($\chi^2(n = 333) = 13.911$, $p = 0.000$). This association between experience of the third scenario and the environment is small (Cramer's V = 0.2). The frequency of requests was reported to be rather low, in most cases 1–2 times per year for scenario 1–3 and "very rarely" for scenario 4. 80.2% of the participants have experienced at least one of the four case scenarios.

Personal attitudes

In terms of their personal attitudes towards NE, the majority of participants were unsure if they would count themselves among those who principally oppose NE. At the same time, half of the sample would consider the decision for or against NE in the light of specific circumstances. Less than 10% would embrace a consumer model, with medical decisions guided by patient preferences (table 6).

In order to reach a better understanding of physicians' decisions for or against prescribing performance-enhancing drugs, participants were confronted with different possible criteria (table 7). The criteria were developed from preparatory interviews with physicians.

The data in table 7 show that only the first three statements on (1.) subjective suffering, (2.) the time-limited use of

Table 3: How would you react to a request for the prescription of a neuroenhancing substance?

	Prescription	Only if no therapeutic alternative	No prescription	Referral
Scenario 1: student	49 (15.3)	**180 (54.4)**	161 (49.2)	24 (7.8)
Scenario 2: single mother	83 (25.6)	**176 (52.9)**	**137 (41.4)**	**14 (4.5)**
Scenario 3: shy woman	107 (32.7)	**244 (70.1)**	**88 (26.8)**	**19 (6.1)**
Scenario 4: renowned scientist	54 (16.5)	**52 (16.1)**	**193 (54.1)**	**35 (10.7)**

The possible answers were "yes" and "no"; the table contains the values for the answer "yes". n_{Total} ranges between 307 and 357 due to missing values.

Table 4: In case of drug prescription in the last question: which of the following substances would you prescribe in the described situation (multiple answers possible)?

	Ritalin© (methylphenidate)	Modasomil© (modafinil)	Antidepressants	Anti-dementia drugs	Beta blockers	n_{Total}
Scenario 1: student	21 (11.7%)	5 (2.9%)	23 (12.7%)	1 (0.6%)	**56 (29.6%)**	205
Scenario 2: single mother	6 (3.4%)	1 (0.6%)	**72 (37.3%)**	1 (0.6%)	13 (7.5%)	206
Scenario 3: shy woman	3 (1.4%)	1 (0.5%)	**110 (43.8%)**	1 (0.5%)	17 (7.8%)	273
Scenario 4: renowned scientist	6 (8.6%)	**24 (32.4%)**	7 (9.9%)	1 (1.4%)	5 (7.1%)	89

The highest value is marked for each scenario. The column "n_{Total}" refers to all participants who had indicated in the previous question that they would prescribe a drug.

Table 5: Do you know of such requests from your own work?

	Yes, *n* (%)	No, *n* (%)	n_{Total}	*p*-value
Scenario 1: student	200 (53.5)	174 (46.5)	374	0.179
Scenario 2: single mother	156 (42.0)	**215 (58.0)**	371	0.002**
Scenario 3: shy woman	180 (52.9)	160 (47.1)	340	0.278
Scenario 4: renowned scientist	75 (21.7)	**270 (78.3)**	345	0.000***

The *p*-values of the χ^2–test are noted in the last column.
*(0.01 ≤ p < 0.05); **(0.001 ≤ p < 0.01); ***(p <0.001). If the values differ significantly (p <0.05), the higher value is in bold letters.

the drug and (3.) avoiding the development of something worse were relevant for the majority of participants.

Finally, participants were asked to consider three statements on NE (table 8). The majority considered the statement that NE is a matter of individual conscience as fairly or completely right. About a quarter were uncertain if NE should become an integral part of medicine, with the remainder agreeing or disagreeing in equal measure. Additionally, the majority thought that physicians' public image and trust would suffer if they moved away from the core business of treating sick people.

Subgroup analyses according to language (German/French), gender, speciality title (psychiatry/general practice) and work experience (0–10 years / >10 years) revealed some differences (χ^2-Test with a *p*-value <0.05) regarding the participants' personal attitudes. For example, French-speaking participants rated the criterion of subjective suffering for prescribing neuroenhancers higher (item 1 of table 7; $p = 0.012$, Cramer's V = 0.14), while German speakers and general practitioners gave more weight to the importance and value of the reason for the request to enhance (item 5 of table 7; $p = 0.000$, Cramer's V = 0.32). Women were more concerned about an erosion of patient trust (third statement of table 8; $p = 0.011$, Cramer's V = 0.19).

At the end of the questionnaire, the physicians were asked to select possible side effects to healthy people from antidepressants, Ginkgo, methylphenidate (Ritalin©), anti-dementia drugs and modafinil (Modasomil©) from a list; ($n_{Total} = 379$). The two most frequently chosen answers were: for antidepressants, nervousness/sleep disorders (64.1%) and liver dysfunction (41.4%); for Gingko, none (39.3%) and nervousness/sleep disorders (7.1%); for methylphenidate (Ritalin©), nervousness/sleep disorders (63.9%) and addiction (47.8%); for anti-dementia drugs, nervousness/sleep disorders (18.2%) and liver dysfunction (15.3%); for modafinil (Modasomil©), nervousness/sleep disorders (22.2%) and arrhythmia (11.6%). The percentage of those who did not choose any of the answers were 12.9% for antidepressants, and 43.0% for Gingko, 26.1% for methylphenidate (Ritalin©), 63.1% for anti-dementia drugs, and 68.3% for modafinil (Modasomil©).

Table 6: Personal attitude.

	I agree, *n* (%)	**Undecided, *n* (%)**	**I do not agree, *n* (%)**	n_{Total}	***p*-value**
As a physician, I refuse NE and would never prescribe such substances.	108 (30.6)	**145 (41.1)**	100 (28.3)	353	0.007**
A decision for or against NE is context-dependent: I do not categorically say no.	**171 (49.0)**	87 (24.9)	91 (26.1)	349	0.000***
When the patient is informed about the side effects and risks of the desired drugs but still wants it, I respect this decision and prescribe the drug.	33 (9.6)	94 (27.3)	**217 (63.1)**	344	0.000***

The *p*-values of the χ^2–test are written in the last column.
*(0.01 ≤ p < 0.05); **(0.001 ≤ p < 0.01); ***(p <0.001). If the values differ significantly (p <0.05), the higher value is in bold letters.

Table 7: Which criteria influence your decision regarding the prescription of drugs in the different scenarios (multiple answers possible)?

	Yes, *n* (%)	**No, *n* (%)**	n_{Total}	***p*-value**
The subjective suffering is intense.	**294 (88.3)**	39 (11.7)	333	0.000***
Rather for temporary use than for an undefined time span.	**275 (82.8)**	57 (17.2)	332	0.000***
To avoid a development that would be worse.	**233 (75.6)**	75 (24.4)	308	0.000***
When the person concerned did not provoke the situation she or he is in.	80 (26.0)	**228 (74.0)**	308	0.000***
Whether the goal is obviously important and valuable or does also benefit others.	90 (30.9)	**201 (69.1)**	291	0.000***
When it is clear that the person concerned tried hard enough to reach the goal through his or her own efforts.	144 (46.5)	166 (53.5)	310	0.211

The *p*-values of the χ^2–test are written in the last column.
*(0.01 ≤ p < 0.05); **(0.001 ≤ p < 0.01); ***(p <0.001). If the values differ significantly (*p* <0.05), the higher value is in bold letters.

Table 8: Please evaluate the following statements.

Statements	**Completely wrong, *n* (%)**	**Fairly wrong, *n* (%)**	**Undecided, *n* (%)**	**Fairly right, *n* (%)**	**Completely right, *n* (%)**
Every physician should decide for her-/ himself, whether she/he wants to practice NE or not.	29 (7.9)	75 (20.4)	63 (17.2)	**110 (30.0**)	90 (24.5)
Neuroenhancement measures are a reality. Given this fact they should become part of medical practice for the benefit of those who wish to use them. This way the assessment and surveillance of risks and undesired side effects can be guaranteed.	43 (12.1)	89 (25.1)	83 (23.4)	**99 (27.9**)	41 (11.5)
The public perception of physicians will be damaged and trust of patients decrease if physicians move away from the core activity of treating disease.	14 (3.9)	58 (16.0)	56 (15.5)	**156 (43.1**)	78 (21.5)

Discussion

Participants' familiarity with the term and experience of requests for NE

More than two-thirds of responding general physicians and psychiatrists did not know the term "neuroenhancement". More than half had not heard of "brain doping". This is surprising considering that the topic is extensively discussed in the public press nowadays. However, when the four case scenarios were described, more than 50% had had experience of situations similar to those of the student or the shy woman in their own medical practice, followed in frequency by the overburdened single mother (42.0%) and the exhausted scientist (21.7%; table 5). This finding shows that many participants may not be very familiar with the public discussion of the phenomenon, but can identify comparable situations from their own practice. A significant number of physicians are confronted "very rarely" or up to twice a year with such requests and only a minority of the sample have patients who ask for cognitive enhancement weekly or monthly. Not surprisingly, certain requests for NE are more frequent in a "rather urban" setting (76.3%) in comparison to a "rather rural" one (23.7%), which might be due to a more competitive environment, higher expectations regarding cognitive and psychosocial functioning in urban workplaces and easier access to information about neuroenhancers.

Attitudes towards NE measures

It is interesting to note that although almost half of the participants declared they would as a matter of principle not prescribe any drugs in cases such as the case scenarios, between 15 and 33% would have prescribed a drug like Ritalin© (methylphenidate), Modasomil© (modafinil), antidepressants or anti-dementia drugs. In fact, in the absence of a therapeutic alternative, most respondents would prescribe a drug, except for the case of the jet-lagged scientist. Overall, antidepressants were mentioned most frequently as the substances that would have been prescribed. There may be less hesitation to prescribe if physicians have long-standing experience with a drug and if the case is similar to a condition that can be classified as a disease, such as social phobia in the case of the shy woman. The other case scenarios – the student who did not prepare in time for his exam, the exhausted mother and the jet-lagged scientist – are all rather far removed from a pathological diagnosis.

Most participants (67%) had a rather pragmatic attitude towards NE; although in general they do not prescribe without an indication, they would consider doing so if there were no therapeutic alternatives, the drug was fairly safe, and if the patient suffered considerably and insisted on the drug. The study of Banjo et al. [12] showed that the safety of cognitive enhancers was also a main concern for physicians in Canada and the USA. In our study, 28% answered – in accordance with the professional guidelines – that they do not prescribe drugs without an indication. A small, but significant minority (5%) espoused a clearly liberal point of view, prescribing drugs at the request of informed patients.

Yet participants are somewhat ambivalent in dealing with the issue of NE. When asked if they would personally subscribe to a categorical refusal of NE, 41% were undecided (table 6). This ambivalence already becomes apparent in the beginning of the questionnaire, when participants were asked about their spontaneous reactions to performance-enhancing drugs. There is a rather constant approval rate of more than 50% to very different statements, such as "neuroenhancement has always been around", or "this is as wrong as doping in sports", or "everyone is responsible for his/her own actions" (table 1).

There is also some uncertainty and disagreement as to how the medical profession should position itself with a view to NE. Most participants would consider NE as a matter of a physician's individual conscience. Nearly two thirds also agree that the public perception of physicians might suffer if medicine's core business moves away from treating sick people. However, opinions are divided on the issue of whether NE should be considered a reality and as such become part of medical practice for the benefit of those who wish to use them. Answers show a distribution over the whole spectrum from "completely wrong" to "completely right" with nearly one fourth (23.4%) of participants "undecided" (table 8).

The ambivalence and uncertainty is in line with other surveys. The main concern of the survey in the US [4] and the study carried out in the US and in Canada [12] was about possible side effects and a majority of the participants in the study of Banjo et al. shared a rather "conservative" view on enhancement, expressing scepticism about the use of modern technologies to produce above normal human capabilities, and being worried about their proper role as physicians. The study of Hotze et al. [4] also showed a similar constellation to the one in our study, with participants espousing a rather pragmatic approach to enhancement measures, accompanied by concerns about undesirable side effects. However, most of the physicians in the US study think that safe and efficient NEPs should be available, although they should not be reimbursed by insurance companies [4]. The survey done in Sweden revealed that participants had more negative attitude toward the use of neuroenhancers (117 physicians and 520 randomly selected individuals) [11].

Understanding of disease criteria and justification for neuroenhancement measures

The openness of many participants to consider prescribing in the absence of a medical indication fits with their appreciation of subjective suffering and malfunctioning in daily life as criteria for disease (table 2). The two medical subdisciplines of general medicine and psychiatry, which were included in this study, have a reputation for taking the patient's subjective perception into account and not reducing medical diagnosis to mere objective criteria. Although the acknowledgement of subjective parameters has long been called for, an emphasis on individual well-being might, on the other hand, lead to a kind of wish-fulfilling medicine that blurs the line between medical need and individual desire. From a subjectivist understanding of disease, enhancement interventions are not necessarily seen as "non-therapeutic interventions". If subjective suffering counts as a criterion for disease, enhancement interventions can be considered as a kind of therapy. This also explains why

many participants do not simply follow medical indications, which are mostly defined according to "objective" disease criteria, but consider the prescription of a drug outside of a clear medical indication as a context-dependent decision.

When asked which criteria influenced their decision to prescribe or not in cases such as the four case scenarios, most respondents chose subjective suffering (table 7). The temporariness of the measure and avoiding the development of something worse were also considered important criteria. In contrast, a majority of the participants disapproved of criteria which involved a moral evaluation of the patients' intentions and goals by "When the person concerned did not provoke the situation she or he is in", "Whether the goal is obviously important and valuable or also benefits others", or "When … the person concerned tried hard enough …". One can conclude from these data that the avoidance of harm (subjective suffering, worse consequences) is seen as a legitimate aim of enhancement measures, but that this is seen largely independently from a moral evaluation of the person concerned.

The importance of the medical indication in Switzerland

Like in many other countries, it is the standard case of pharmacological treatment in Switzerland that physicians should prescribe drugs according to the related indication. Nevertheless, in some instances it is also expected or even obligatory to prescribe drugs off-label. However, this is not the case regarding the prescriptions which were described in the present study, because the questionnaire clearly referred to healthy individuals who wanted to improve their cognitive performance or wanted to manage non-health related problems. An exception may be the scenario with the shy woman. Her state might possibly also be described as a mild personality disorder or phobia. In general, drugs prescribed for the case scenarios described in our study should not have been reimbursed by Swiss health insurance [18]. The Swiss Social Insurance Law (ATSG) defines in Art. 3 disease as "every impairment of physical or mental health, which is not the consequence of an accident, requires medical examination or treatment or is followed by inability to work" [19]. The medicine compendium of Switzerland names as indications for Ritalin© (methylphenidate) hyperkinetic behaviour dysfunctions, attention-deficit hyperactivity disorder and narcolepsy and adds that "Ritalin© is indicated as a part of a comprehensive therapy programme, which should typically comprise of psychological, educational and social treatment measures" [20]. The information for modafinil in Switzerland (Modasomil©) contains the following indications: excessive somnolence in connection with narcolepsy with and without cataplexy. It adds that "a treatment with Modasomil© should only be carried out after careful diagnostic investigation by a neurologist/pulmonologist" [21]. The conditions described in the case scenarios would not have fallen under these categories, nor would there have been an indication for anti-dementia drugs.

Limitations of the study

Regarding self-selection bias in the group of the study respondents, there are two potential scenarios. First, physicians who are particularly critical with regard to cognitive enhancement practices may have been especially interested in participating in the survey and are thus overrepresented. Second, physicians who are very much in favour of such practices may have been especially interested in the study. As a consequence, individuals with a positive attitude to such practices might be overrepresented. However, both scenarios do not seem very likely from our point of view, given the coherence with results of previous studies: similarly to the study of Hotze et al. [4], we found a high prevalence of "mixed attitudes", i.e. an ambivalent evaluation of cognitive enhancement practices in our study sample.

Furthermore, bias due to socially desired response behavior is rather improbable not only because of the anonymity of the questionnaire but also because some responses could be considered to be the socially undesirable response from an ethical or even from a legal point of view (for example the prescription of costly drugs without a medical indication).

Another source of potential bias is that our questionnaire contains assumptions about an increasing use of neuroenhancers; this is not a proven fact, although the rising figures for the use of certain drugs, such as methylphenidate (Ritalin©) suggest that they are used beyond clear medical indications [15]. Finally, another limitation of the study could be the descriptions of the four case scenarios. They could only be briefly described conveying a schematic impression of the underlying clinical problem to the participants. Apart from the case of the shy woman, the cases are clearly non-pathological.

Conclusions

Our study shows that there is considerable openness to NE among Swiss psychiatrists and general practitioners. This is not an uncritical acceptance, however, but depends on the expected alleviation of suffering, the lack of therapeutic alternatives, the safety of the drug and the preferences of the individual. Objective criteria for disease are secondary in these considerations. It might be, however, that a proximity to recognised diseases, such as social phobia, or the familiarity with a drug fosters acceptance of a NE measure.

The lack of knowledge of the terms "neuroenhancement" or "brain doping", the heterogeneity of spontaneous responses to different moral statements on NE and the uncertainty and ambivalence present in the replies to some items indicate that physicians might profit from a more systematic ethical debate on these issues. Given the sometimes rather diverging positions and increasing prescription rates of drugs such as methylphenidate (Ritalin©) that can be used as neuroenhancers, a debate within the profession might also be clarifying and help define individual members' views. Finally, the prescription of drugs for non-therapeutic purposes is a phenomenon that deserves further analysis and research. There is a need for an ethical and legal clarification regarding the justification of drug prescriptions, which should be addressed by the respective professional societies.

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References

1 Greely H, Sahakian B, Harris J, Kessler RC, Gazzaniga M, Campbell P, et al. Towards responsible use of cognitive-enhancing drugs by the healthy. Nature. 2008;456:702–5.

2 Lenk C. Kognitives Enhancement und das «Argument des offenen Lebensweges». In: Schöne-Seifert B, Talbot D, Opolka U, Ach JS. Neuro-Enhancement. Ethik vor neuen Herausforderungen. Münster: Mentis-Verlag; 2008:93–106. German.

3 Outram SM. The use of methylphenidate among students: the future of enhancement? J Med Ethics. 2010;36:198–202.

4 Hotze TD, Shah K, Anderson EE, Wynia MK. "Doctor, would you prescribe a pill to help me … ?" a national survey of physicians on using medicine for human enhancement. Am J Bioeth. 2011;11:3–13.

5 Savulescu J, ter Meulen R, Kahane G. Enhancing Human Capacities. Oxford: Wiley-Blackwell; 2011.

6 McCabe SE, Knight JR, Teter CJ, Wechsler H. Non-medical use of prescription stimulants among US college students: prevalence and correlates from a national survey. Addiction. 2005;100:96–106.

7 Sahakian B, Morein-Zamir S. Professor's little helper. Nature. 2007;450:1157–9.

8 Deutsche Angestellten-Krankenkasse (DAK). Gesundheitsreport 2009: Analyse der Arbeitsunfähigkeitsdaten. Schwerpunktthema Doping am Arbeitsplatz [Internet]. 2009 (cited 2012 May 31). Available from: http://www.dak.de. German.

9 Biedermann F. Die Haltung der Deutschschweizer Bevölkerung zum pharmazeutischen cognitive enhancement. Hypothesen basierend auf einer postalischen Befragung in einer Beispielgemeinde. Dissertation at Basel University, 2011. German.

10 Franke AG, Bonertz C, Christmann M, Huss M, Fellgiebel A, Hildt E, et al. Non-medical use of prescription stimulants and illicit use of stimulants for cognitive enhancement in pupils and students in Germany. Pharmacopsychiatry. 2011;44:60–6.

11 Bergström LS, Lynöe N. Enhancing concentration, mood and memory in healthy individuals: an empirical study of attitudes among general practitioners and the general population. Scand J Public Health. 2008;36:532–7.

12 Banjo OC, Nadler R, Reiner PB. Physician attitudes towards pharmacological cognitive enhancement: safety concerns are paramount. PLoS One. 2010;5:e14322. German.

13 Mayring P. Qualitative Inhaltsanalyse. 8nd ed. Weinheim: Beltz Verlag; 2003. German.

14 Lieb K. Hirndoping. Warum wir nicht alles schlucken sollten. Manheim: Artemis & Winkler Verlag; 2010. German.

15 Kühne R, Rapold R. Der Bezug von Methylphenidat in der Schweiz: Nicht alarmierend – Fragen stellen sich dennoch. Schweizerische Ärztezeitung. 2011;92:34;1295–9. German.

16 Bortz J. Statistik für Sozialwissenschaftler. 5nd ed. Berlin: Springer-Verlag; 1999. German.

17 Field A. Discovering statistics using SPSS. 3nd ed. Los Angeles: SAGE Publications Ltd; 2009.

18 SAMW, Swiss Academy of the Medical Sciences. Rechtliche Grundlagen im medizinischen Alltag. Ein Leitfaden für die Praxis. 2008. German.

19 Swiss Social Insurance Law. Bundesgesetz über den Allgemeinen Teil des Sozialversicherungsrechts (ATSG) [Internet]. 2000 (cited 2012 May 31). Available from: http://www.admin.ch. German.

20 Arzneimittel-Kompendium der Schweiz, Fachinformation «Ritalin©». 2011 (cited 2012 May 31). Available from: http://www.kompendium.ch. German.

21 Arzneimittel-Kompendium der Schweiz, Fachinformation «Modasomil©». 2011 cited 2012 May 31). Available from: http://www.kompendium.ch. German.

3.3 Conclusion

Our survey among 379 physicians revealed that the participants were confronted with requests for CE, but not very often as one can see in their responses about the case scenarios. A bit more than half of the participants were familiar with the case scenario about the student, followed by the case scenario about the shy women. The willingness to prescribe such CE depends on the expected alleviation of suffering, the lack of therapeutic alternatives, the safety of the drug and the preferences of the individual. Overall, most of the participants embrace a pragmatic position towards cognitive enhancement. More than half of the participants would prescribe a CE to the student, the single mother or the shy women if no therapeutic alternatives were available with a maximum for the shy women of 70.1% of agreement. For that case scenario was also the highest value of positive answers for a prescription observed, leading to our suggestion that some of the participants ascribed a social phobia to the shy woman.
Overall, we observed a high degree of uncertainty regarding a categorical refusing of prescribing CE. Out of ten participants were 4 physicians undecided and about 3 people did agree to a categorical refusing respectively did not agree to it. Only a minority would agree to a consumer model where physicians would prescribe CE if patients or, more precisely in such cases, clients would ask for it. More than 60% of the physicians did not agree to such a consumer model whereas a bit less than 30% were undecided.

Overall our data provides evidence that a minority of patients do ask for CE and that about half of the physicians decide on a case-to-case basis if they prescribe CE. The analysis of the survey among physician in Switzerland provides evidence that there is a need for fostering discussions about CE in public.

4 Publications on Surveys in non-peer-reviewed Journals

4.1. Akademien der Wissenschaften Schweiz - Anwendungskontext Neuroenhancement (p. 44-56), 2012. German.

4.2. Bulletin SAGW - Braindoping im Alltag (p. 50 and photo front page), 2012. German.

4.3. SÄZ, Schweizerische Ärztezeitung - Die Bedeutung des Neuroenhancement in der ärztlichen Praxis (p. 504-507), 2013. German.

4.4. SuchtMagazin - Einstellungen und Umgang von ÄrztInnen mit Neuroenhancement (p. 25-27), 2013. German.

The following four articles are all in German and published in non-peer-reviewed journals in Switzerland. The goal of these publications was to foster the discussion in society by contributing to the information flow between research and society. Additionally, we wanted to work against a so called media hype concerning the reported prevalence of use of CE in the media [4]. Therefore, these four articles are in line with the newspaper articles in appendix B containing information about my work as well as in line with one of the goals of this work. By evaluating data about usage and handling of CE as well as attitudes about CE, we want to add data to the discussion taken place in literature as well as in society.

The four articles were published (1) in a information booklet called 'Medizin für Gesunde? Analysen und Empfehlungen zum Umgang mit Human Enhancement', published by the Swiss Academies of Arts and Sciences in 2012 (edition: 1200 examples in German, 500 examples in French). (2) in the quarterly published journal of the Swiss Academy of Humanities and Social Sciences of 3. July 2012 (edition: 2850 examples); (3) in the weekly published Swiss physician magazine of the Swiss Medical Association of 27. March 2013 (edition: 36'360 examples in total in French and German); and (4) in the bimonthly published magazine 'Suchtmagazin' number 3 of 2013 (edition: 1400 examples).

6. Anwendungskontext Neuroenhancement

Regula Ott, Nikola Biller-Andorno

Enhancement ist ein vielgestaltiges Phänomen. Zugleich ist ein Verständnis der konkreten Interventionen, der Erwartungen potenzieller Nutzer, die Perspektive der Ärzteschaft sowie der Bevölkerung insgesamt für eine umfassende Würdigung eine wichtige Grundlage. Die Arbeitsgruppe hat exemplarisch den Bereich des Neuroenhancements als Fokus für eine solche vertiefte Exploration verfügbarer empirischer Daten ausgewählt.

Neuroenhancement ist kein neues Phänomen. Indios nehmen seit Jahrhunderten Koka, wenn sie trotz Müdigkeit weiter arbeiten müssen. In manchen Gegenden Asiens steigern Menschen ihre Wachheit mit Betel, wohingegen in afrikanischen und arabischen Ländern Khat gekaut wird. Ein weiteres traditionelles Aufputschmittel ist Nikotin, das über Acetylcholin-Rezeptoren zu einer Zunahme des Neurotransmitters Dopamin führt. Die Wirkung ist eine kurzfristig gesteigerte Leistungsfähigkeit, gefolgt von Entzugserscheinungen wie leichte Erschöpfung und Verstimmung. Ein anderes, weithin bekanntes Neuroenhancementprodukt (NEP) ist Koffein, das die Reaktionszeit, die Aufmerksamkeit, das Arbeitsgedächtnis und die Wachheit steigert. Weitere Produkte, die zu einer moderaten Erhöhung der kognitiven Leistung führen, sind Schokolade, Tee, Rotwein und Zucker.[67]

Mit der Forschung über neurologische und psychiatrische Krankheiten stieg die Anzahl von Medikamenten, die einen Einfluss auf die Aufmerksamkeit und das Gedächtnis von gesunden Menschen haben, sehr schnell an. Es gibt mehr als 160 Substanzen, deren leistungssteigernde Wirkungen bereits angewandt oder noch wissenschaftlich geprüft werden. In randomisierten, doppelblinden, placebokontrollierten Studien haben 15 Substanzen eine potenzielle Wirkung aufgewiesen.[68] Hierzu zählen Koffein, Energydrinks sowie Ritalin, Adderall und Modafinil.

Ziel dieses Kapitels ist es, einen Überblick über die empirische Datenlage zur Verbreitung von NEPs zu geben. Zudem werden wir auf Umfragen bei Ärztinnen und Ärzten sowie potenziellen und tatsächlichen Nutzern zum Umgang mit NEPs eingehen, unter besonderer Berücksichtigung der Studie, die im Auftrag der Arbeitsgruppe vom Institut für Biomedizinische Ethik der Universität Zürich durchgeführt wurde.

67 Vgl. Förstl 2009.
68 Vgl. Franke 2010.

Ritalin, Adderall und Modafinil

Die Medikamente, die in der Literatur sehr häufig als Beispielsubstanzen für kognitives Neuroenhancement erwähnt werden, sind Ritalin (Methylphenidat) und Adderall (gemischte Amphetaminsalze). Beides sind Medikamente, die zur Behandlung des Aufmerksamkeitsdefizit-/Hyperaktivitätssyndroms entwickelt worden sind (ADHS).[69] Ritalin und Adderall erhöhen den Level der Neurotransmitter Noradrenalin und Dopamin, die beide bei der Kontrolle von Wachheit, Konzentration und Aufmerksamkeit beteiligt sind.[70] Ritalin steigert diese Levels durch die Blockierung der Rückkoppelungsbindungsstelle. Dies bedeutet, dass Ritalin nur dann zu höheren Konzentrationen dieser zwei Neurotransmitter führt, wenn die Zellen aktiv sind. Im Gegensatz dazu erhöhen Amphetamine die Konzentration der Neurotransmitter auch im nichtaktivierten Zustand der Zelle. Man nimmt an, dass Amphetamine direkt die Freisetzung dieser Neurotransmitter steigern sowie die Rezeptoren besetzen, die sonst der Zelle eine Rückmeldung geben würden, dass soeben eine grosse Menge an Neurotransmittern freigesetzt wurde. Dieser unterschiedliche Wirkmechanismus von Ritalin und Amphetaminen führt dazu, dass Amphetamine auch in einer Umgebung mit sehr wenig Reizen Wachheit und Konzentration steigern, was bei Ritalin in der Regel nicht der Fall ist.[71] Nahe verwandt mit Amphetaminen ist das Suchtmittel «Ice» oder «Crystalmeth». Diese Droge besteht aus Metamphetamin, d.h. aus D-Amphetamin mit einer zusätzlichen Methylgruppe. Ebenfalls strukturell verwandt mit Amphetaminen ist «Ecstasy» (Methylendioxy-Metamphetamin = MDMA).

Bei ADHS-Patienten führen Ritalin und Adderall allgemein zur Verminderung der Unachtsamkeit, Hyperaktivität und Impulsivität. Berichte von gesunden Personen, die Ritalin nahmen, wurden in verschiedenen Zeitungen und Zeitschriften dokumentiert.[72] Die Teilnehmer der Selbstversuche mit Ritalin sprachen dabei regelmässig von einer gesteigerten Energie und einer höheren Konzentration, doch in einzelnen Berichten wurden auch Nebenwirkungen wie Schlafprobleme angesprochen. Die Medienpräsenz

69 Vgl. Greely 2008.
70 Vgl. Lieb 2010: 66.
71 Vgl. Lieb 2010: 72.
72 Vgl. Talbot 2009; Szalavitz 2009; Schmid 2009; Ritter 2009; Nobs D et al. 2011.

von pharmakologischem Neuroenhancement (pNE) wurde von Partridge et al. untersucht. Die Forschenden analysierten 142 englischsprachige Zeitungsartikel zum Thema «Neuroenhancement» in der Periode von 2008 bis 2010. Dabei fanden die Autoren, dass in diesen Artikeln die möglichen Vorteile vom Gebrauch von Substanzen als Neuroenhancement öfter erwähnt wurden als mögliche Nebenwirkungen. Zudem bezögen sich Aussagen in den Medien, dass Neuroenhancement häufig und weit verbreitet sei, auf Literatur, die diese Aussagen nur schwach stützten.[73]

Die Wirksamkeit von Ritalin und Adderall zum pharmakologischen Neuroenhancement wurde anhand der Analyse verschiedener Publikationen untersucht.[74] Die Analyse von je sechs randomisierten, doppelblinden, placebokontrollierten Studien zu Ritalin sowie zu Amphetaminen mit total 205 bzw. 154 Probanden zeigte, dass beide Substanzen bei Gesunden die Vigilanz und Aufmerksamkeit steigern sowie die Reaktionszeit verkürzen. Zudem konnte in mehreren Studien gezeigt werden, dass diese Effekte bei Müdigkeit besonders stark waren. Die Effekte sind vergleichbar mit denen von Energydrinks sowie Koffein. Befragungen zeigen, dass die Wirksamkeit von solchen NEPs hoch eingeschätzt wird. Dies könnte daran liegen, dass die Studien unter Laborbedingungen nicht ausreichend mit den realen Situationen von Konsumenten gleichgesetzt werden können. Zudem könnte der Placeboeffekt dazu führen, dass Konsumenten ihre Leistungsfähigkeit subjektiv überschätzen.[75]

Beobachtete Nebenwirkungen in diesen Studien für Ritalin sowie Amphetamine waren besonders häufig Tachykardie, Hypertonie, innere Unruhe sowie erstaunlicherweise Konzentrationsstörungen (>10%). Als häufige Nebenwirkungen (>1%) traten Kopfschmerzen, Schwindel, gastrointestinale Beschwerden und viele weitere auf. Stimulanzien, besonders Amphetamine, können zudem zu einer Abhängigkeit führen.[76] Die Einnahme einer Tablette birgt dabei ein kleineres Abhängigkeitsrisiko als die intravenöse Applikation oder das Schnupfen, da diese Anwendungen zu einer sehr schnellen Zunahme der betreffenden Substanz im Blut führen.

Die Analyse der Daten der Helsana-Gruppe ergab, dass der Bezug von Ritalin bei den Versicherten in der Schweiz von 2006 bis 2009 kontinuierlich zunahm. Der Anteil an Personen bezüglich allen Versicherten (nTotal= 20000–28900) stieg in diesen vier Jahren um 42% von 0,26

73 Vgl. Partridge et al. 2011.
74 Vgl. Franke et al. 2010.
75 Vgl. Eckhardt et al. 2011: 26.
76 Vgl. Franke et al. 2010.

auf 0,37; die durchschnittliche Bezugsmenge um 9,7% von 5600 mg auf 6200 mg. Die Abgabe fand in 30% der Bezüge über frei praktizierende Ärztinnen und Ärzte und in ca. 70% über Apotheken statt. Die Verschreibung erfolgten vor allem durch Kinder- und Jugendmediziner (27,8%), Psychiater (24,9%), Fachärzte der allgemeinen Medizin, der allgemeinen inneren Medizin und praktische Ärzte (25,6%) sowie Kinder- und Jugendpsychiater (10,5%).[77]

Ein weiteres Psychopharmakon, Modafinil (Markennamen: Provigil und Nuvigil [USA], Vigil [D], Modasomil [CH, A]), gehört wie Ritalin und Adderall zu den wohl bekanntesten kognitiven NEP. Modafinil wurde für die Behandlung von Erschöpfung entwickelt, die durch Narkolepsie, Schlafapnoe oder Schlafstörungen durch Schichtarbeit verursacht worden ist. Der Umsatz der Firma Cephalon überstieg mit ihrem Produkt namens Provigil im Jahr 2008 1 Milliarde US-Dollar; 2011 verdiente sie mit diesem Produkt bereits 1,126 Milliarden. Seit Juni 2009 verkauft Cephalon zusätzlich das Produkt Nuvigil, das für ausgeprägte Schläfrigkeit assoziiert mit Narkolepsie, Schlafapnoe und Schichtarbeitschlafstörung zugelassen ist. Der Jahresumsatz von Nuvigil im 2011 betrug 186 Millionen.[78] Zusammen mit Provigil bedeutet dies einen Umsatz im 2011 von über 1,3 Milliarden, was etwas mehr als 8% des gesamten Jahreseinkommens von Cephalon entspricht.

2008 wurde Cephalon von der amerikanischen Food and Drug Administration (FDA) mit 425 Millionen US-Dollar gebüsst. Die FDA machte Cephalon dafür verantwortlich, Werbung für Provigil sowie für zwei weitere Medikamente ausserhalb des zugelassenen Gebrauches zu verbreiten.[80]

Die Hauptmotivation, Modafinil ausserhalb des zugelassenen Gebrauches zu verwenden, ist die Überwindung von Erschöpfung oder Jetlag. Die Mechanismen der Wirkung von Modafinil wurden bis jetzt noch nicht völlig verstanden, jedoch konnte nachgewiesen werden, dass Modafinil direkte und indirekte Effekte auf verschiedene Neurotransmittersysteme hat. Minzenberg und Carter veröffentlichten eine Literaturübersicht aller Publikationen, die 2008 in der Datenbank PubMed nach der Eingabe des Begriffes «Modafinil» gefunden wurden. Die Autoren folgerten «that there is now increasing evidence that Modafinil can improve cognitive functions,

77 Vgl. Kühne et al. 2011.
78 Vgl. Historic sales by branded Cephalon products 2011. http://ir.tevapharm.com/phoenix.zhtml?c= 73925&p=irol-reportsAnnual. (Abgerufen: 15. März 2012).
79 Vgl. Annual reports (2008 & 2010). Cephalon GmbH. http://investors.cephalon.com/phoenix.zhtml?c= 81709&p=irol-reportsannual. (Abgerufen: 15. März 2012).
80 Vgl. U.S. Department of Justice Press Release. 2008.
81 Minzenberg et al. 2008: 1496.

particularly working memory, episodic memory, and the processes requiring cognitive control»[81]. Ausserdem erhöht Modafinil die Wachsamkeit und vermindert das Gefühl der Erschöpfung. Von den Autoren wurde postuliert, dass die präsynaptische Wiederaufnahme von Dopamin und Noradrenalin gehemmt werde.

Franke und Lieb analysierten sechs randomisierte, doppelblinde, placebokontrollierte Studien zu Modasomil mit insgesamt 218 Probanden. Die Auswertung zeigte ein inkonsistentes Bild bezüglich Vigilanz, Aufmerksamkeit, Gedächtnis, Stimmung und subjektive Aufmerksamkeit nach der Einnahme von Modasomil.[82] Die Reaktionszeit wurde aber eindeutig verkürzt und bei müden Probanden verbesserten sich deutlich die oben erwähnten Aspekte wie Vigilanz, Aufmerksamkeit und Reaktionsgeschwindigkeit. Diese Effekte sind für eine Vielzahl von Professionen von grosser Relevanz, darunter auch für Soldaten. Publikationen des britischen Verteidigungsministeriums 2004 zeigten auf, dass die Armee seit 1998 24 000 Modasomil-Tabletten bestellt hatte.[83]

Dabei sollte jedoch die Wirkung von Modasomil nicht überschätzt werden. In vergleichenden Studien zeigte sich, dass Koffein bei einzelnen Tests sogar wirkungsvoller als Modasomil war.[84] In den analysierten Studien zur Wirkung von Modasomil bei gesunden Personen zeigten sich mögliche Nebenwirkungen wie Tachykardie, Hypertonie, Palpitationen, Tremor, Unruhe, Kopfschmerzen, Schwindel und Mundtrockenheit.

Studien zur Erhebung der Verbreitung und dem Gebrauch von NEPs wurden in einzelnen Ländern durchgeführt. Im Folgenden werden wir auf die Umfrage bei Ärztinnen und Ärzten in der Schweiz sowie im Ausland eingehen sowie auf Umfragen bei Studierenden, Wissenschaftlern und Wissenschaftlerinnen sowie bei der Bevölkerung im Allgemeinen.

Im TA-SWISS-Bericht zu Human Enhancement wird beschrieben, dass Ritalin zu nichttherapeutischen Zwecken oft aus legal verschriebenen Beständen abgezweigt wird.[85] Die Umfrage bei den Studierenden der Universität Zürich zeigte, dass etwas mehr als die Hälfte der Studierenden Ritalin, Adderall und/oder Modasomil von Freunden und Bekannten erhielten, gefolgt vom Bezug via Ärztinnen und Ärzten. Im Bericht der TA-SWISS wird zudem erwähnt, dass die Verschreibung von Ritalin zwischen 1996 bis

82 Vgl. Franke et al. 2010.
83 Vgl. Sample 2004.
84 Vgl. Franke et al. 2010.
85 Vgl. Eckhardt et al. 2011: 26.

2000 stark angestiegen sei und der Pro-Kopf-Konsum von Ritalin in den USA wesentlich höher liege als der in der Schweiz.[86] Dies belegen auch die Verkaufszahlen von Novartis. Der Nettoumsatz von Ritalin und Focalin (ähnliche Substanz wie Ritalin) belief sich im 2011 auf 398 Mio. Dollar in den USA und gesamthaft auf 152 Mio. Dollar in den übrigen Ländern, was einer Steigerung von 19 % gegenüber dem Vorjahr entspricht.[87]

Studie zu Ärzteschaft und pharmakologischem Neuroenhancement

Schweiz

Im Auftrag der Arbeitsgruppe wurde vom Institut für Biomedizinische Ethik der Universität Zürich eine Studie zum Umgang von Schweizer Ärztinnen und Ärzten in den Bereichen Psychiatrie und Hausarztmedizin mit pharmakologischem Neuroenhancement (pNE) durchgeführt.[88] «Die Bedeutung des Neuroenhancements für praktizierende ÄrztInnen im Bereich Psychiatrie und Psychotherapie sowie im Bereich der Hausarztmedizin» (NEpA). Die Auswertung der 379 Fragebögen (Rücklaufquote = 24 %) ergab, dass die Studienteilnehmer zumeist eine zurückhaltende und zugleich pragmatische Position gegenüber Neuroenhancement einnehmen. Zugleich werden der subjektive Leidensdruck und die Funktionalität im Alltag von den meisten als die entscheidenden Kriterien für das Vorliegen von Krankheit erachtet.

Die Antworten bringen eine gewisse Ambivalenz zum Ausdruck: Obwohl die meisten Studienteilnehmer (63,3 %) der Aussage zustimmen, dass das Vertrauensverhältnis der Medizin leiden könnte, wenn es sich von seinem Kerngeschäft – Kranke zu heilen – entferne, waren doch 39,4 % dafür, Neuroenhancement (NE) als Teil medizinischer Praxis zu akzeptieren. 54 % erachteten den Einsatz von NE als Frage des individuellen ärztlichen Gewissens.

Zugleich heben die Studienteilnehmer auf die Bedeutung von Einzelfallentscheiden ab: Zwei Drittel der Ärztinnen und Ärzte wählten die Aussage «Grundsätzlich verschreibe ich nichts ohne Indikation. Ist der Leidensdruck aber gross und besteht beim Patienten der Wunsch, nichts unversucht zu

86 Vgl. Eckhardt et al. 2011: 27f.
87 Vgl. Novartis Gruppe 2011.
88 Ott et al. 2012.

lassen, so kann es sein, dass ich auch etwas ohne klare Indikation verschreibe. Dies hängt jedoch von der Substanz, Kontraindikationen und unerwünschten Wirkungen ab». Etwas weniger als ein Drittel wählten die Antwort «Wenn ich keine Indikation stellen kann, verschreibe ich auch nichts», und nur 4,6 % kreuzten die Antwort «Ich kläre den Patienten über allfällige Risiken des gewünschten Präparates auf und wenn er es dann immer noch möchte, so soll er es halt mal ausprobieren» an. Bei einer Frage zur persönlichen Haltung gegenüber Neuroenhancement zeigte sich ein ähnliches Bild: Fast die Hälfte der Teilnehmenden wählten die Antwort «Bei NE kommt es auf die Situation an: Ich sage nicht grundsätzlich nein».

Der Fragebogen beinhaltete zudem vier Fallbeispiele in denen die Personen ihren Arzt, ihre Ärztin für ein Produkt zum pharmakologischen Neuroenhancement fragen. Die Beispiele handeln von einem Studenten mit baldigen Prüfungen, der etwas für den «Schlussspurt» möchte, von einer alleinerziehenden Mutter, die ihre Mutter pflegt und gerne ein «Aufputschmittel» hätte, von einer schüchternen jungen Frau, die gerne ein Medikament hätte gegen ihre Hemmungen im Umgang mit Männern, sowie von einem berühmten Wissenschaftler, der etwas gegen Jetlag möchte.

Die Mehrheit der Ärztinnen und Ärzte würde nur im Fallbeispiel zur schüchternen jungen Frau ein Medikament verschreiben, wenn psychotherapeutische Verfahren oder Ähnliches nicht (genügend) helfen würde. Ohne diesen Vorbehalt des Fehlens therapeutischer Alternativen lehnte die Mehrheit der Ärztinnen und Ärzte in allen vier Fallbeispielen eine Verschreibung ab. Trotzdem würde für keines der vier Fallbeispiele eine Mehrheit der Ärztinnen und Ärzte eine Medikamentenverschreibung kategorisch ablehnen.

Wichtig für eine mögliche Verschreibung von Medikamenten in Situationen wie in den vier Fallbeispielen beschrieben, ist für die Mehrheit der Ärztinnen und Ärzte, dass der subjektive Leidensdruck gross ist, dass der Einsatz zeitlich begrenzt ist und nicht auf unbestimmte Zeit und dass Schlimmeres verhindert werden kann. Das Kriterium, «dass sich der Betroffene genug angestrengt hat, um es aus eigenen Kräften zu schaffen», stösst bei je etwa der Hälfte der Befragten auf Zustimmung bzw. auf Ablehnung. Dass der Betroffene nicht für die Situation verantwortlich ist und ob das Ziel, das mit der Einnahme verfolgt werden würde, nachvollziehbar wichtig und wertvoll ist und allenfalls auch Dritten zugutekommt, ist für die Mehrheit der Ärztinnen und Ärzte für eine allfällige Verschreibung nicht ausschlaggebend.

Auf die Frage, ob die Teilnehmenden solche Anfragen wie in den Fallbeispielen beschrieben aus ihrer eigenen Praxis kennen, antwortet die Mehrheit mit «nein» beim Beispiel mit der alleinerziehenden Mutter (58,0 %) sowie im Beispiel mit dem berühmten Wissenschaftler (78,3 %). In den anderen zwei Beispielen ist die Anzahl der Personen, die diese Situation bereits aus eigener Erfahrung kennen, etwas gleich hoch wie die, die sie noch nie erlebt hat.

Zusammenfassend kann gesagt werden, dass die Ärztinnen und Ärzte dieser Umfrage eher zurückhaltend, aber dennoch überwiegend nicht kategorisch ablehnend gegenüber pharmakologischem Neuroenhancement sind. Anhand der Fallbeispiele konnte gezeigt werden, dass in der Praxis in der Tat nach solchen Produkten gefragt wird.

International

Ein ähnliches Bild wie die eben beschriebene Studie aus der Schweiz zeigte eine Umfrage aus den USA.[89] Die US-Studie beinhaltet 633 ausgewertete Fragebögen (Rücklaufquote = 46,4 %). Die Daten zeigen, dass die teilnehmenden Ärztinnen und Ärzte eine beachtliche Ambivalenz gegenüber Neuroenhancement aufweisen. Die Mehrheit dieses Samples haben Bedenken bezüglich Enhancement, vor allem zu sozialer Gerechtigkeit. Zugleich finden viele dieser Ärztinnen und Ärzte, dass sichere und effiziente NEPs erhältlich sein sollten, doch nicht von der Krankenkasse bezahlt werden dürften. Die meisten dieser Ärztinnen und Ärzte haben bereits Anfragen für ein NEP erhalten und immerhin teilweise etwas verschrieben. Eine weitere Studie unter 212 Ärztinnen und Ärzten aus den USA und Kanada zeigte, dass das grösste Bedenken dieser Gruppe bezüglich der Verschreibung von NEPs mögliche Nebenwirkungen waren. Zudem konnte in dieser Umfrage gezeigt werden, dass mehr Ärztinnen und Ärzte dieses Samples einer 65-jährigen Person ein sicheres und effektives NEP verschreiben würden als einer 25-jährigen Person.[90] Eine weitere Studie zu den Einstellungen von 117 Ärztinnen und Ärzten sowie 520 zufällig ausgewählten Personen aus Stockholm bezüglich Enhancement wurde in Schweden durchgeführt. Die Ergebnisse zeigen, dass beide Gruppen negativ gegenüber dem Gebrauch von NEPs eingestellt sind, wobei diese Einstellung bei den 520 zufällig ausgewählten Personen weniger ausgeprägt ist als bei den Ärztinnen und Ärzten. Weiter wurden altruistische Gründe für einen Gebrauch von NEPs eher akzeptiert als egoistische.[91]

89 Vgl. Hotze et al. 2011.
90 Vgl. Banjo et al. 2010.
91 Vgl. Bergström et al. 2008.

Aufgrund der MeSH-Begriffe, mit denen diese zwei Studien in PubMed klassifiziert wurden, führten wir eine Literatursuche mit den Begriffen «physician», «enhancement» und «drug» von 2008 bis heute durch. Es wurden 62 Publikationen in PubMed gelistet, von denen neben den drei oben erwähnten Studien keine weiteren zur Einstellung von Ärztinnen und Ärzten zu Enhancement waren.

Studien zu Studierende, Wissenschaftler oder allgemeine Bevölkerung und pNE

Schweiz

Eine weitere Umfrage des Instituts für Biomedizinische Ethik der Universität Zürich wurde bei Studierenden der Universität Zürich durchgeführt (noch unveröffentlichte Daten). Mehr als 1700 Studierende füllten den Fragebogen zum Gebrauch und der Einstellung zu pharmakologischem Neuroenhancement aus. Die Ergebnisse zeigen, dass über 6 % der Studierenden schon mindestens einmal Ritalin, Adderall und/oder Modasomil als gesunde Person zur Steigerung der Konzentration oder der Wachsamkeit genommen haben. Von diesen haben etwa 5 % diese Produkte für einen Nutzen mit Bezug auf ihr Studium genommen. Die restlichen Personen konsumierten die Substanzen als Partydrogen oder in keiner bestimmten Situation. In der Studie zeigte sich, dass mehr Männer als Frauen solche Produkte nahmen und dass die betreffenden Studierenden im Schnitt etwas schlechtere Noten aufwiesen als die Nichtkonsumenten.

Den Studierenden wurden zudem Fragen zu ihrer persönlichen Einstellung zu pNE gestellt, u. a. zu ihren möglichen Bedenken sowie Gründen zur Einnahme von NEPs. Dafür wurden die zehn Bedenken und die sechs Gründe ausgewählt, die Ferenc Biedermann in seiner ebenfalls in der Schweiz durchgeführten Umfrage aufgrund der neuroethischen Literatur, den deutschsprachigen Medienberichten und offenen Interviews verwendet hatte.[92] Die häufigsten Bedenken der Studierenden, die bereits Ritalin, Adderall oder Modasomil für pNE genommen hatten, waren die Sorge vor möglichen Nebenwirkungen sowie «Das Ziel dieser Produkte ist es, dass man noch mehr leisten kann. Diesen Leistungswahn finde ich bedenklich». Bei den Nichtkonsumenten waren die häufigsten Bedenken auch die Sorge vor möglichen Nebenwirkungen sowie «Meine innere Stimme sagt mir, dass wir besser die Finger von solchen Produkten lassen sollen». Die zwei häufigsten Gründe, warum solche Produkte genommen wurden bzw. man sich vorstellen könnte, solche Produkte zu nehmen, waren für beide Gruppen die gleichen: «Ich könnte dadurch viele Arbeiten rascher erledigen. So hätte ich mehr Freizeit und weniger Stress» und «Ich könnte dank diesen Produkten schneller lernen. Und vielleicht würde ich Sachen begreifen, die ich früher nicht verstanden habe». Bei der Frage, ob sie ein Produkt, das ihren IQ für eine begrenzte Zeit steigern würde und ohne jegliche Nebenwirkungen wäre, einnehmen würden, antworteten etwa 60 % der Studierenden mit «Ja, einmal zum Ausprobieren» oder mit «Ja, vermutlich mehr als einmal». Die restlichen 40 % der Teilnehmenden würden das Produkt nicht nehmen oder waren unentschieden.

Die Ausgangsfrage der erwähnten Studie von Biedermann war: «Was hält die Bevölkerung von effizientem pharmazeutischem cognitive Enhancement (PCE)?». Als Beispielgemeinde für die Deutschschweiz wurde Kreuzlingen gewählt. Die Rücklaufquote betrug 291 bzw. 229 Fragebogen (14,6 % bzw. 11,5 %). Die zwei häufigsten Bedenken waren das der Unnatürlichkeit und das zur inneren Stimme. Der häufigste Grund zugunsten von PCE war in der Umfrage von Biedermann der persönliche Nutzen. Zudem würde ungefähr ein Fünftel der befragten Personen «sicher» oder «wahrscheinlich» wirkungsvolle, nebenwirkungsfreie PCE einnehmen. Rund zwei Drittel würden PCE «sicher» oder «wahrscheinlich» nicht einnehmen. Der Rest ist «unentschieden». Gesamthaft kann von der Befragung in Kreuzlingen gesagt werden, dass die Mehrheit der Deutschschweizerinnen und Deutschschweizer einer persönlichen Einnahme von PCE ablehnend gegenüber steht, selbst unter der Annahme vollkommener Nebenwirkungsfreiheit.

Deutschland

Die «Deutsche Angestellten-Krankenkasse» (DAK) führte eine Umfrage bei rund 3000 deutschen Angestellten zwischen 20 und 50 Jahren durch. 5 % der Befragten erklärten, als gesunde Person Medikamente genommen zu haben, um ihre Leistung oder ihr Wohlbehagen zu steigern. Weniger als 2,5 % aller Befragten nahmen fortlaufend Medikamente, um ihre Leistung oder ihr Wohlbehagen zu steigern. Vier von zehn Personen, die sagten, solche Medikamente fortlaufend zu nehmen, nahmen sie von mehreren Malen pro Woche bis zu täglich (weniger als 1 % der 3000 Angestellten).[93]

Eine Studie zum Wissen und Gebrauch von NEPs bei 1035 Schülerinnen und Schülern (18- bis 21-jährig) und 512 Universitätsstudierenden (durch-

92 Vgl. Biedermann 2011.

93 Vgl. Meiners 2009.

schnittlich 24-jährig) wurde in Deutschland durchgeführt. Die Umfrage ergab, dass 1,3 % der Schülerinnen und Schüler und Studierenden bereits Methylphenidat (Ritalin, Concerta), Amphetamine (Adderall) oder Modafinil zu nichttherapeutischen Zwecken genommen haben. Im letzten Jahr hatten es 0,3 % genommen und 0,06 % im letzten Monat. Aufgeteilt nach den zwei Gruppen haben 1,6 % der Studierenden und 0,8 % der Schülerinnen und Schüler mindestens einmal eine dieser Substanzen für pNE verwendet.[94]

Ein Drittel der Schülerinnen und Schüler wusste von der Möglichkeit, die kognitiven Fähigkeiten mithilfe von z. B. Ritalin zu steigern. Von illegalen Substanzen wie Amphetaminen, Kokain oder Ecstasy hatten zwei Drittel der Schülerinnen und Schüler gehört, dass es zur Steigerung der kognitiven Fähigkeiten genommen werden kann. Von den Studierenden wussten fast zwei Drittel von der Wirkung auf die kognitiven Fähigkeiten von Ritalin sowie von illegalen Drogen. Medizinstudierende waren etwas besser informiert über rezeptpflichtige Stimulanzien als über illegale Drogen, wohingegen das Gegenteil für die Pharmaziestudierenden der Fall war.

In einer Studie zu Formen der Stresskompensation und Leistungssteigerung bei knapp 8000 Studierenden in Deutschland zeigte sich, dass 12 % der Studierenden seit Beginn des Studiums eine oder mehrere Subtanzen eingenommen haben, um die Studienanforderungen besser bewältigen zu können.[95] Mehr als ein Drittel dieser Personen nahm dafür Medikamente wie Schmerzmittel, Schlafmittel oder Antidepressiva. 23 % rauchten Cannabis, 18 % nahmen Ritalin. Unbekannte Substanzen sowie Betablocker (therapeutisch verwendet zur Behandlung von Herzrhythmusstörungen, können auch zur Verminderung von Ängstlichkeit genommen werden) wurden jeweils von mehr als 10 % konsumiert. Neben Amphetaminen (9 %), Kokain (3 %) und Ecstasy (2 %) wurde zudem von 4 % der Studierenden Modafinil genommen (Mehrfachnennungen waren möglich).

Am häufigsten wurden diese Produkte zur Prüfungsvorbereitung eingesetzt (55 %), etwas seltener in Prüfungssituationen (45 %). Stress wurde von 53 % der Konsumenten solcher Produkte als Grund angegeben. Zudem besteht ein Zusammenhang zwischen verspürtem Leistungsdruck und der Einnahme von leistungssteigernden Mitteln.

Zwischen den Konsumenten solcher Produkte und den übrigen Studierenden dieser Studie bestehen deutliche Unterschiede bezüglich der Zuversicht in die eigene Zukunft. Der Anteil der (sehr) zuversichtlichen Studierenden in Bezug auf den Studienerfolg, die berufliche Zukunft, das persönliche Wohlergehen und das materielle Auskommen ist unter den Konsumenten deutlich geringer als unter den übrigen Studierenden.

94 Vgl. Franke et al. 2011.
95 Vgl. Middendorff et al. 2012.

International

Eine amerikanische Studie über den Gebrauch von Ritalin und Adderall zeigte, dass 6,9 % der befragten Studierenden Ritalin und/oder Adderall bereits mindestens einmal zu nichttherapeutischen Zwecken genommen haben.[96] Teilnehmende der Umfrage waren 10 904 zufällig ausgewählte Universitätsstudierende von 119 vierjährigen Colleges oder Universitäten aus 39 Staaten der USA. Die 12-Monats-Prävalenz lag bei 4,1 % und die 30-Tages-Prävalenz bei 2,1 %. Ausserdem zeigte die Umfrage, dass der nichtmedizinische Gebrauch bei männlichen und weissen Universitätsstudenten sowie bei Studierenden, die tiefere Durchschnittsnoten aufwiesen, höher lag. Allgemein hatten Universitäten mit kompetitiveren Aufnahmebedingungen eine höhere Rate von Studierenden, die Ritalin oder Adderall nahmen.

Die Fachzeitschrift «Nature» führte im Anschluss an einen Kommentar in derselben Zeitschrift eine Umfrage durch.[97] Die zwei Wissenschaftlerinnen fragten die Leserschaft, ob sie sich vorstellen könnten, ihre «brainpower» mit Medikamenten zu steigern. Wegen der grossen Anzahl von Antworten startete «Nature» eine Onlineumfrage bezüglich des Gebrauchs der drei Medikamente Methylphenidat (Ritalin), Modafinil (Provigil) und Betablocker.[98] Die Analyse der Antworten von 1400 «Nature»-Lesenden aus 60 Ländern zeigte, dass eine bzw. einer von fünf Befragten eines der drei Medikamente in einer zulassungsüberschreitenden Anwendung verwendet hatte. Das Ziel der Einnahme war bei diesen Befragten die Steigerung der Konzentration oder des Gedächtnisses. Bei diesen 20 % der Befragten, die solche Medikamente einnahmen, war Ritalin das meistverwendete kognitive NEP (mit 62 %, die es nutzten). Modafinil wurde von 44 % dieser Gruppe genommen und 15 % dieser Gruppe gaben die Einnahme von Betablockern an. Somit nahmen einige der Befragten bereits mehr als eines der drei Medikamente ein. 4,4 % der Befragten verwendete NEP einmal jährlich, 4 % einmal monatlich, 4 % einmal wöchentlich und 3,8 % täglich.

Die Differenzen zwischen den Studien bezüglich des Gebrauchs von NEPs zu nichttherapeutischen Zwecken (zwischen 1,5 und 20 % der befragten

96 Vgl. McCabe et al. 2005.
97 Vgl. Sahakian et al. 2007.
98 Vgl. Maher 2008.

Population) liegen vermutlich v.a. an den verschiedenen Studiendesigns und Befragungsgruppen. Auch unterscheiden sich die Studien in ihrer Repräsentativität. Unabhängig davon kann jedoch aus den Studien geschlossen werden, dass NEPs konsumiert werden, wenngleich von einer Minderheit. Zudem besteht eine gewisse Unsicherheit bezüglich pNE sowohl bei den Konsumenten wie bei Ärztinnen und Ärzten, die mit Anfragen nach Rezepten für entsprechende Medikamente konfrontiert werden.

Fazit

1. Neuroenhancement wird praktiziert, wobei die Grenze zwischen traditionellen Stimulanzien wie Koffein und pharmakologischem Enhancement fliessend ist. In der öffentlichen Wahrnehmung wird Neuroenhancementprodukten (NEP) oft mehr Wirksamkeit zugeschrieben, als sie tatsächlich besitzen; Effekte auf Parameter wie Vigilanz oder Konzentration sind vielmehr denjenigen traditioneller Stimulanzien vergleichbar. NEP haben signifikante Nebenwirkungen, die jedoch in Mediendarstellungen häufig in den Hintergrund treten.

2. Produkte, die als Neuroenhancer eingesetzt werden können (z. B. Modafinil), haben ein beträchtliches wirtschaftliches Potenzial bzw. sind bereits heute sehr umsatzstark. Angesichts aktueller Forschungsanstrengungen im Bereich pharmakologischer Substanzen, die sich leistungssteigernd auf bestimmte Gehirnfunktionen auswirken können («brain doping»), darf angenommen werden, dass die Palette möglicher Produkte in Zukunft noch breiter wird.

3. Wenngleich die allgemeine Bevölkerung in der Schweiz dem Einsatz von NEPs eher skeptisch gegenüber zu stehen scheint, werden NEPs doch genutzt, besonders in Populationen, in denen kognitive Leistungen eine besondere Rolle spielen, wie Schüler, Studierende und Wissenschaftler. NEPs werden nur zum Teil von Ärztinnen und Ärzten für den betreffenden Nutzer verschrieben. Die Mehrzahl der Schweizer Hausärztinnen und -ärzte und Psychiaterinnen und Psychiater ist mit derartigen Anfragen vertraut, wenngleich sie nicht häufig damit konfrontiert wird.

4. Die Teilnehmenden an der von der AG Human Enhancement in Auftrag gegebenen Studie «Die Bedeutung des Neuroenhancements für praktizierende ÄrztInnen im Bereich Psychiatrie und Psychotherapie sowie im Bereich der Hausarztmedizin» (NEpA) stehen dem Einsatz von NEPs mehrheitlich zwar zurückhaltend, doch nicht kategorisch ablehnend gegenüber. Diese Haltung korrespondiert mit einem Krankheitsverständnis, das subjektives Leiden und Funktionalität im Alltag in den Vordergrund rückt. Zugleich kommt eine gewisse Unsicherheit und Uneinigkeit bezüglich eines angemessenen Umgangs mit Enhancement in der praktischen Medizin zum Ausdruck.

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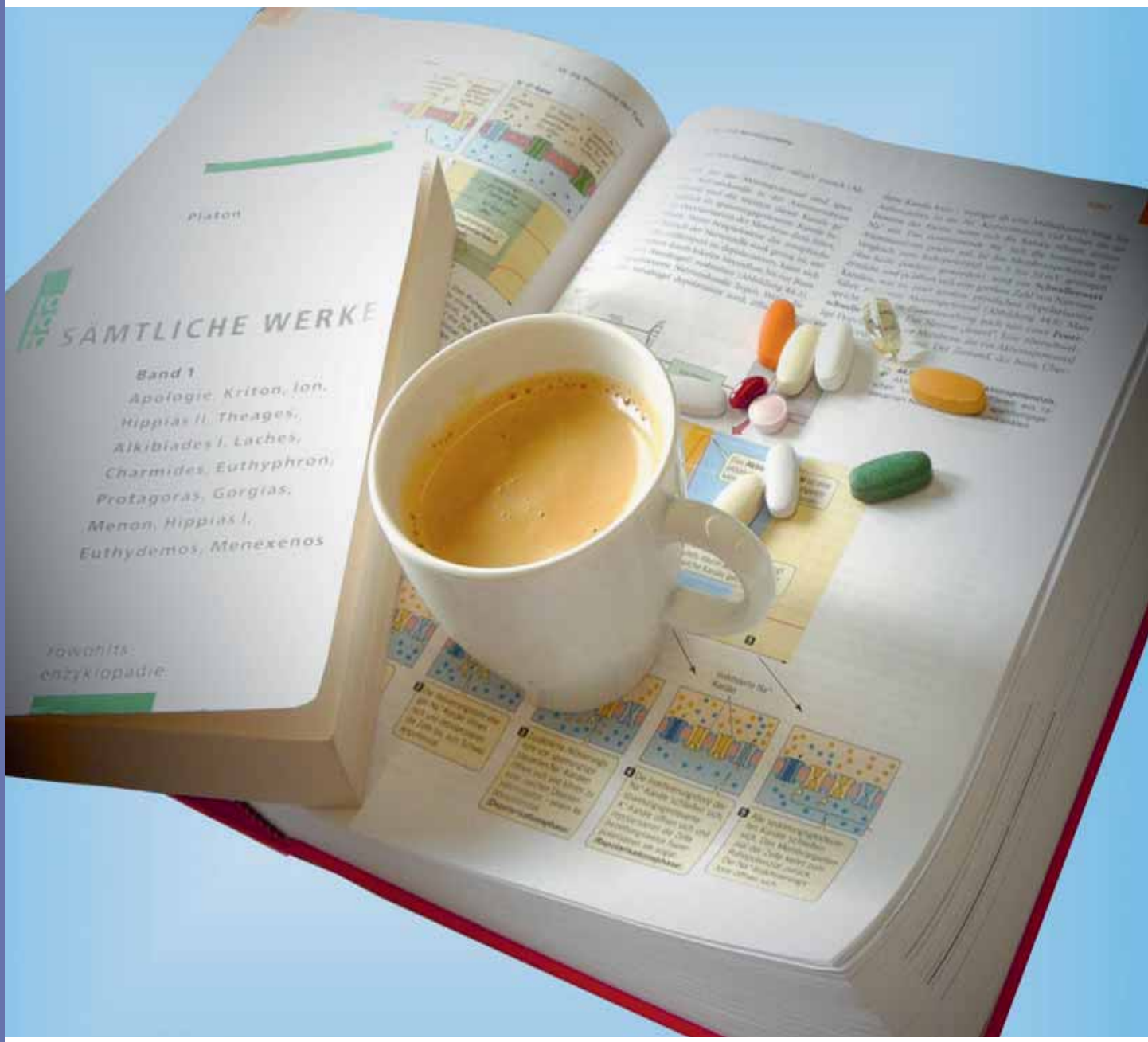
Bulletin

SAGW Schweizerische Akademie der Geistes- und Sozialwissenschaften
ASSH Académie suisse des sciences humaines et sociales
ASSM Accademia svizzera di scienze umane e sociali
ASSM Academia svizra da scienzas moralas e socialas
SAHS Swiss Academy of Humanities and Social Sciences

Dossier

Gesundheitssystem im Wandel



Akademien der Wissenschaften Schweiz: FuturICT – Der CERN der Sozialwissenschaften?
SAGW-News: Assemblée annuelle 2012 – Sous le signe de la coopération et de la visibilité
Schwerpunkte: Die erste spanische Übersetzung von Erasmus' «Lob der Torheit» entdeckt

Braindoping im Alltag

Regula Ott, Nikola Biller-Andorno, Institut für Biomedizinische Ethik, Universität Zürich

In gewissem Sinne betreiben wir alle «Braindoping». Der Espresso nach der Mittagspause, eine ausgiebige Nachtruhe, ein Waldlauf – das alles sind Versuche, unser Gehirn möglichst fit zu machen für die Anforderungen, die uns erwarten. Doch wie sieht es aus, wenn wir den Begriff enger fassen und darunter die Einnahme von Medikamenten durch gesunde Personen zur Steigerung von Gehirnleistungen verstehen?

Wie verschiedene Studien aus den USA, Deutschland sowie der Schweiz zeigen, konsumieren zwischen 1,3% und 6,9% der Studierenden Mittel zur Steigerung von Konzentration oder Wachheit, z.B. Ritalin® oder Provigil®. Dabei sind es in der Regel nicht die hervorragenden Studierenden, die solche Produkte eingesetzt haben, sondern diejenigen mit eher schlechten Noten. Übrigens greifen durchaus auch Professoren bisweilen zu solchen «kleinen Hilfen».

Ärztinnen und Ärzte mit Anfragen konfrontiert

Wie eine Studie ergab, die vom Institut für Biomedizinische Ethik (IBME) der Universität Zürich im Rahmen der AG «Human Enhancement» der Akademien der Wissenschaften Schweiz durchgeführt wurde, hat die Mehrheit der 379 befragten praktizierenden ÄrztInnen in den Bereichen Psychiatrie und Hausarztmedizin bereits Anfragen für solche Produkte erlebt, wenn auch nur circa ein- bis zweimal pro Jahr. Etwa die Hälfte der StudienteilnehmerInnen nehmen dabei eine pragmatische Position gegenüber Braindoping ein: Auch wenn sie im Allgemeinen keine Medikamente ohne Indikation verschreiben würden, könnten sie sich vorstellen, dies zu tun, falls es keine therapeutischen Alternativen gäbe, das Medikament ziemlich sicher wäre und der subjektive Leidensdruck hoch wäre. Etwa ein Drittel der Befragten würde sich dem Braindoping kategorisch verweigern, und eine Minderheit von etwa 10% der ÄrztInnen würde eine radikal liberale Position einnehmen und informierten Patienten allein aufgrund ihres Wunsches Medikamente verschreiben.

Entlastung mit Konsequenzen

Noch sind die Möglichkeiten effektiven, risikoarmen Braindopings beschränkt. Doch sollten dereinst entsprechende medikamentöse Möglichkeiten zur Verfügung stehen, ist anzunehmen, dass ein signifikanter Teil der Bevölkerung einem Konsum – sei es mit ärztlicher Verschreibung oder in Eigenregie – nicht abgeneigt wäre. In einer Studie des IBME mit über 1700 Studierenden der Universität Zürich konnte gezeigt werden, dass etwa ein Drittel der Personen, die bereits mindestens einmal in ihrem Leben ein Medikament als Braindoping konsumiert haben, davon ausgingen, dass es in zehn Jahren normal sein wird, solche Produkte zu nehmen.

Doch während dem überlasteten Individuum mit medikamentösem Braindoping möglicherweise kurzfristig geholfen wäre, würden sich die Normen weiter verschieben – Ansprüche an Leistung, Verfügbarkeit und Mobilität würden weiter steigen, auf Kosten der Toleranz für Unpässlichkeiten und Unangepasstheiten, die aber zugleich das Humane einer Gesellschaft ausmacht.

Ziel der Studie

Die AG «Human Enhancement» hat einen Ansatz gewählt, der medizinische, sozial- und geisteswissenschaftliche Perspektiven zusammenführt. Mit ihren Erwägungen möchte sie nicht nur Hilfestellung für eine Positionierung der Ärzteschaft bieten, sondern auch zu einer breiteren gesellschaftlichen Debatte beitragen.

Die Bedeutung des Neuroenhancements in der ärztlichen Praxis

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«Human Enhancement» bezeichnet medizinische oder biotechnologische Interventionen, deren Zielsetzung nicht primär therapeutischer oder präventiver Art, sondern eine «Verbesserung» nichtpathologischer Merkmale ist. Eine Arbeitsgruppe der Akademien der Medizinischen Wissenschaften (SAMW) und der Geistes- und Sozialwissenschaften (SAGW) hat die ethischen Fragen des Enhancements vertieft untersucht und ihre Analysen und Empfehlungen in der Broschüre «Medizin für Gesunde?» (www.akademien-schweiz.ch → Projekte und Themen) veröffentlicht. In loser Folge erscheinen in der SÄZ Auszüge aus dem Bericht. Die hier vorgestellte NEpA-Studie wurde im Auftrag der Arbeitsgruppe und mit deren Unterstützung durchgeführt. Die Studie im Volltext erschien in Swiss Medical Weekly [1]*.

Neuroenhancement (NE) – im Sinne einer Verbesserung kognitiver und emotionaler Fähigkeiten beim gesunden Menschen mittels medikamentöser Substanzen – ist ein intensiv erörtertes Thema in der Medizinethik [2–6]*. Dabei stehen sich einerseits der Respekt vor der Autonomie derjenigen, die NE-Produkte verwenden möchten, und andererseits die Bedenken bezüglich gesundheitlicher Risiken und problematischer gesellschaftlicher Entwicklungen (etwa in Form eines übersteigerten Leistungsdrucks mit zunehmender Entsolidarisierung) gegenüber.

Zugleich gibt es nur wenige empirische Daten zu (potentiellen) Nutzerinnen und Nutzern [7–11] und noch weniger zu den (potentiellen) Versorgern [5, 12, 13]. Zumindest bei verschreibungspflichtigen Präparaten spielen Ärztinnen und Ärzte eine Schlüsselrolle. Daher ist von besonderer Relevanz, dass ihre Wahrnehmungen und Perspektiven in die gesellschaftliche Debatte Eingang finden.

Die NEpA-Studie

Die Studie «Die Bedeutung des Neuroenhancements für praktizierende ÄrztInnen im Bereich Psychiatrie und Psychotherapie sowie im Bereich der Hausarztmedizin» (NEpA) zielt darauf ab, die Erfahrungen und Einstellungen von Ärzten, die in ihrer Praxis – de facto oder zumindest potentiell – mit der Nachfrage nach Neuroenhancement-Produkten konfrontiert werden, besser zu verstehen [1]. Zu diesem Zweck wurden in der deutschsprachigen sowie der französischsprachigen Schweiz je 800 Fragebögen versandt, wovon 393 Fragebögen returniert wurden (Rücklaufquote 24,7%). Für die Auswertung konnten 379 Fragebögen verwendet werden (23,9%).

Das Sample bestand aus 180 Frauen (47,9%) und 196 Männern (52,1%; n_{Total} = 376 aufgrund von fehlenden Werten). Das durchschnittliche Alter betrug 48 Jahre, mit einer Streuung von 32 bis 69 Jahren. 208 Personen hatten einen Facharzttitel in «Psychiatrie und Psychotherapie», 116 Personen einen solchen in «Allgemeinmedizin», 65 Personen in «Innerer Medizin», und je zwei Personen hatten einen anderen Facharzttitel bzw. keinen Titel. 19 Personen hatten zwei Titel (n_{Total} = 374).

Bekanntheit der Begriffe «Neuroenhancement» und «Hirndoping»

Auf die Frage «Ist Ihnen der Begriff Neuroenhancement bekannt?», antwortete eine Mehrheit der Antwortenden (68,9%, n_{Total} = 376) mit «Nein». 53,6% der Teilnehmenden (n_{Total} = 371) kannten hingegen den Begriff «Hirndoping».

Konzept von Krankheit und Behandlung

Bei der Frage, aufgrund welcher Kriterien die Ärztinnen und Ärzte einer Störung Krankheitswert zumessen würden, wurde das Kriterium «subjektiver Leidensdruck» am häufigsten gewählt (83,6%), gefolgt von «negative Auswirkungen auf alltägliche Arbeitsfähigkeit» (76,5%) (Tab. 1).

Gefragt, welche Aussage ihnen persönlich am ehesten entspreche, wenn ein Patient nach Medikamenten fragt, für die keine Indikation gestellt werden kann, wählte die Mehrheit der Antwortenden die Aussage: «Grundsätzlich verschreibe ich nichts ohne Indikation. Ist der Leidensdruck aber gross und besteht beim Patienten der Wunsch, nichts unversucht zu lassen, so kann es sein, dass ich auch etwas ohne klare Indikation verschreibe. Dies hängt jedoch

* Die Literaturangaben finden sich unter www.saez.ch → Aktuelle Nunmmer oder → Archiv → 2013 → 13/14.

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Dr. phil. Simone Romagnoli
Dr. biol. Adrian Rüegsegger, TA-SWISS
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PD Dr. theol. Markus Zimmermann-Acklin

Tabelle 1

Frage: Wenn Sie bestimmen müssen, ob eine Störung mit Krankheitswert vorliegt oder nicht, welche der folgenden Kriterien sind für Sie ausschlaggebend (Mehrfachantworten möglich):

	Ja, n (%)	Nein, n (%)	Manchmal, n (%)	Total (n)
Der subjektive Leidensdruck	317 (83,6)	8 (2,1)	50 (13,2)	375
Die Zuordenbarkeit gemäss einem anerkannten Klassifikationssystem (Bsp. ICD oder DSM)	165 (43,5)	93 (24,5)	100 (26,4)	358
Insbesondere in der somatischen Medizin die Objektivierbarkeit mittels labormedizinischer bzw. bildgebender Verfahren	165 (43,5)	70 (18,5)	117 (30,9)	352
Negative Auswirkungen auf alltägliche Arbeitsfähigkeit	290 (76,5)	11 (2,9)	65 (17,2)	366

Tabelle 2

Was würden Sie in der geschilderten Situation tun?

	Verschreibung (%)	Nur falls keine ther. Alternativen (%)	Keine Verschreibung (%)	Überweisung (%)
Student	49 (15,3)	180 (54,4)	161 (49,2)	24 (7,8)
Alleinerz. Mutter	83 (25,6)	176 (52,9)	137 (41,4)	14 (4,5)
Schüchterne Frau	107 (32,7)	244 (70,1)	88 (26,8)	19 (6,1)
Wissenschaftler	54 (16,5)	52 (16,1)	193 (54,1)	35 (10,7)

Tabelle 3

Kennen Sie entsprechende Anfragen aus Ihrer Praxis?

	Ja, *n* (%)	Nein, *n* (%)	n_{Total}	*p*-Wert
Fallbeispiel 1: Student	200 (53,5)	174 (46,5)	374	.179
Fallbeispiel 2: Alleinerziehende Mutter	156 (42,0)	**215 (58,0)**	371	.002**
Fallbeispiel 3: Schüchterne Frau	180 (52,9)	160 (47,1)	340	.278
Fallbeispiel 4: Wissenschaftler	75 (21,7)	**270 (78,3)**	345	.000***

Der *p*-Wert des X^2–Tests ist in der letzten Spalte angegeben.
* (p < 0,05); ** (p < 0,01); *** (p < 0,001). Wenn die Werte signifikant unterschiedlich sind (p < 0,05), dann ist der höhere Wert in fettgedruckten Zahlen.

von der Substanz, Kontraindikationen und unerwünschten Wirkungen ab» (67,0%, n = 250; n_{Total} = 373). 28,4% der Ärzte (n = 106) antworteten mit: «Wenn ich keine Indikation stellen kann, verschreibe ich auch nichts». Nur 4,6% (n = 17) wählten die Antwort: «Ich kläre den Patienten über allfällige Risiken des gewünschten Präparates auf und wenn er es dann immer noch möchte, so soll er es halt mal ausprobieren.» Bei 71,6% der Studienteilnehmer besteht also eine prinzipielle Offenheit für die Verschreibung von Neuroenhancern.

Die Fallbeispiele

Den Studienteilnehmenden wurden vier Fallbeispiele vorgestellt. Das erste handelt von einem Studenten, der vor den letzten und entscheidenden beiden Prüfungen steht; er bittet seinen Arzt für den «Schlussspurt» um ein Medikament, das sein Schlafbedürfnis etwas reduziert, um die verbleibende Zeit noch möglichst gut nutzen zu können.

Das zweite Fallbeispiel handelt von einer alleinerziehenden Frau zweier schulpflichtiger Kinder, die seit ein paar Wochen auch ihre terminal erkrankte Mutter zu Hause pflegt und mittlerweile ziemlich müde ist. Sie bittet ihren Arzt in dieser Situation um ein «Aufputschmittel».

Das dritte Fallbeispiel bezieht sich auf eine 24-jährige Frau, die sich als sehr schüchtern bezeichnet und im Umgang mit Männern recht unsicher ist und ihre Hemmungen loswerden möchte. Sie wünscht sich von ihrem Arzt ein Mittel, das ihre ängstliche Verkrampftheit günstig beeinflusse.

Das vierte und letzte Fallbeispiel handelt von einem renommierten Wissenschafter, der soeben von einer Kongressreise zurückgekehrt ist. Er leidet unter einem Jetlag und wünscht deshalb eine Verschreibung von Modafinil, da er so bald wie möglich wieder voll leistungsfähig sein muss.

Nach der Beschreibung des jeweiligen Fallbeispiels folgten Fragen zur Reaktion der Ärztinnen und Ärzte in der geschilderten Situation, den möglichen Substanzen, die (falls überhaupt) verschrieben werden würden, und ob die Ärzte mit solchen Anfragen bereits konfrontiert wurden. Die Reaktionen auf die geschilderten vier Situationen sind in Tabelle 2 dargestellt.

Die Daten zeigen, dass die Antwort «Ich würde ein Medikament verschreiben» zwar von der Mehrheit der Teilnehmenden in allen vier Fällen abgelehnt wurde. Trotzdem würden etwa ein Drittel (32,7%) der schüchternen Frau ein Rezept aushändigen und etwa ein Viertel der Ärzte der alleinerziehenden Mutter (25,6%).

Die Antworten auf die Frage, ob die Ärztinnen und Ärzte entsprechende Anfragen bereits selbst erlebt haben, sind in Tabelle 3 dargestellt. Fallbeispiel 1 und 3 sind etwa der Hälfte der Teilnehmenden aus der eigenen Praxis bekannt. Etwas weniger Personen (42%) kannten das zweite Fallbeispiel aus eigener Anschauung und noch weniger (20%) jenes des berühmten Wissenschafters. Die Anfragen sind allerdings nicht sehr häufig, sondern werden mehrheitlich mit «1–2 Mal jährlich» angegeben.

Persönliche Einstellung

Eine grosse Zahl der teilnehmenden Ärztinnen und Ärzte konnte sich nicht entscheiden, ob sie für oder gegen eine prinzipielle Ablehnung von NE sind

(41,1%, $n_{Total} = 353$). Die Mehrheit hingegen stimmte der Aussage zu, dass es bei NE auf die Situation ankommt und sie nicht grundsätzlich «nein» sagen würden (49,0%, $n_{Total} = 349$). Nur eine Minderheit würde einem Konsumentenmodell zustimmen, bei dem die medizinische Entscheidung zum Verschreiben eines Präparats auf dem Wunsch des Patienten basiert (9,6%, $n_{Total} = 344$).

Um zu eruieren, wovon eine allfällige Verschreibung in den Fallbeispielen beeinflusst wurde, wurden den Ärzten sechs verschiedene Aussagen präsentiert. Diese Aussagen stammten aus Interviews mit klinisch tätigen Ärztinnen und Ärzten und bezogen sich auf 1) den subjektiven Leidensdruck, 2) die zeitliche Begrenzung einer Einnahme, 3) die Verhinderung von Schlimmerem, 4) die Unverschuldung der eigenen Situation, 5) die Wichtigkeit und den Wert des Wunsches für eine Verbesserung und 6) die sichtbaren Anstrengungen, es aus eigener Kraft versucht zu haben. Für die Mehrzahl der befragten Ärztinnen und Ärzte waren die ersten drei Aussagen zum subjektiven Leidensdruck, zur zeitlichen Begrenzung einer Einnahme und zur Verhinderung von Schlimmerem relevant (Werte zwischen 75% und 88%, bei den anderen drei Aussagen zwischen 26% und 47%).

Am Ende des Fragebogens wurden die Ärzte gebeten, drei Aussagen zu bewerten. Die Mehrheit stimmte der Aussage «Jeder Arzt, jede Ärztin sollte selber entscheiden, ob er NE praktizieren möchte oder nicht» zu (30,0% ziemlich richtig resp. 24,5% völlig richtig, $n_{Total} = 367$). Eine weitere Aussage lautete «Neuroenhancement-Praktiken sind eine Realität. Da dies nun mal so ist, sollten sie zum Wohle des Anfragenden Teil der ärztlichen Tätigkeit werden. So kann die Beurteilung und Überwachung von Risiken und Nebenwirkungen gewährleistet werden.» Hier war sich etwa ein Viertel unsicher (23,4%), die verbleibenden Teilnehmenden stimmten zu etwa gleichen Teilen zu (39,4%) bzw. lehnten diese Aussage ab (37,2%). Eine dritte Aussage schliesslich postulierte, dass das Arztbild Schaden nehme und das Vertrauen der Patienten in ihre Ärzte sinke, wenn diese sich immer mehr von der eigentlichen Krankheitsbehandlung wegbewegten; dies fand die Mehrheit der Studienteilnehmer (64,6%) zutreffend.

Gruppenanalysen bezüglich Sprache (Französisch/Deutsch) und Geschlecht zeigten, dass französischsprachige Teilnehmende häufiger den subjektiven Leidensdruck als Kriterium für das Vorliegen einer krankhaften Störung wählten ($p = 0,012$) und dass der Aussage zur Erosion des Vertrauens der Patienten in ihre Ärzte Frauen häufiger zustimmten als Männer ($p = 0,011$).

Limitationen der Studie

Angesichts der Rücklaufquote von rund 25% stellt sich die Frage nach möglichen Verzerrungen. So ist denkbar, dass vornehmlich diejenigen Ärzte/-innen die Umfrage ausgefüllt haben, die eine prononciert kritische oder liberale Haltung gegenüber NE haben. Dagegen spricht, dass sich die gefundenen Daten dieser Studie mit früheren, in anderen Ländern durchgeführten Studien decken [z. B. 5]. Verzerrungen bezüglich sozial erwünschter Antworten sind auch eher unwahrscheinlich; nicht nur aufgrund der mehrfach betonten Anonymität, sondern auch, weil durchaus ethisch wie juristisch bedenkliche Antworten gegeben wurden (z. B. das Verschreiben ohne Vorliegen einer Indikation).

Fazit

Die NEpA-Studie zeigt, dass die befragten Ärztinnen und Ärzte NE mehrheitlich zurückhaltend gegenüberstehen, doch diese nicht grundsätzlich ablehnen. Die Entscheidung hängt vielmehr von den Alternativen, den erwarteten Auswirkungen des Leidens, der Sicherheit des Medikamentes und der Präferenz der anfragenden Person ab. Objektive Kriterien zur Krankheit sind eher zweitrangig. Je krankheitsnäher die Situation (vgl. etwa das Fallbeispiel der schüchternen jungen Frau), desto wahrscheinlicher ist dabei die Bereitschaft zur Verschreibung eines Medikamentes.

Erstaunlicherweise waren die Begriffe «Neuroenhancement» und «Hirndoping» vielfach unbekannt. Dennoch werden die befragten Ärzte, wie sich gezeigt hat, in der Praxis durchaus mit entsprechenden Anfragen konfrontiert. Dieser Befund sowie die Heterogenität der Antworten zu verschiedenen moralischen Aussagen zum NE zeigen, dass Ärzte vermutlich von einer vertieften ethischen Debatte profitieren würden. Eine solche Debatte könnte dazu führen, dass Unsicherheiten und Ambivalenzen bei ethischen Fragen zu NE reflektiert und persönliche sowie die standesrechtlichen Positionen geklärt werden könnten.

Literatur

1 Ott R, Lenk C, Miller N, Neuhaus Bühler R, Biller-Andorno N. Neuroenhancement – perspectives of Swiss psychiatrists and general practitioners. Swiss Med Wkly. 2012;142:w13707.

2 Greely H, Sahakian B, Harris J, Kessler RC, Gazzaniga M, Campbell P, et al. Towards responsible use of cognitive-enhancing drugs by the healthy. Nature. 2008;456:702–5 .

3 Lenk C. Kognitives Enhancement und das «Argument des offenen Lebensweges». In: Schöne-Seifert B, Talbot D, Opolka U, Ach JS. Neuro-Enhancement. Ethik vor neuen Herausforderungen. Münster: Mentis-Verlag; 2008:93–106.

4 Outram SM. The use of methylphenidate among students: the future of enhancement? J Med Ethics. 2010;36:198–202.

5 Hotze TD, Shah K, Anderson EE, Wynia MK. «Doctor, Would You Prescribe a Pill to Help Me ...?» a national survey of physicians on using medicine for human enhancement. Am J Bioeth. 2011;11:3–13.

6 Savulescu J, ter Meulen R, Kahane G. Enhancing Human Capacities. Oxford: Wiley-Blackwell; 2011.

7 McCabe SE, Knight JR, Teter CJ, Wechsler H. Non-medical use of prescription stimulants among US college students: prevalence and correlates from a national survey. Addiction. 2005;100:96–106.

8 Sahakian B, Morein-Zamir S. Professor's little helper. Nature. 2007;450:1157–9.

9 Deutsche Angestellten-Krankenkasse (DAK). Gesundheitsreport 2009: Analyse der Arbeitsunfähigkeitsdaten. Schwerpunktthema Doping am Arbeitsplatz [Internet]. 2009 (cited 2012 May 31). www.dak.de/content/filesopen/Gesundheitsreport_2009.pdf

10 Biedermann, F. Die Haltung der Deutschschweizer Bevölkerung zum pharmazeutischen cognitive enhancement. Hypothesen basierend auf einer postalischen Befragung in einer Beispielgemeinde. Dissertation. Universität Basel; 2011.

11 Franke AG, Bonertz C, Christmann M, Huss M, Fellgiebel A, Hildt E, et al. Non-Medical Use of Prescription Stimulants and Illicit Use of stimulants for Cognitive Enhancement in Pupils and Students in Germany. Pharmacopsychiatry. 2011;44:60–6.

12 Bergström LS, Lynöe N. Enhancing concentration, mood and memory in healthy individuals: an empirical study of attitudes among general practitioners and the general population. Scand J Public Health. 2008;36:532–7.

13 Banjo OC, Nadler R, Reiner PB. Physician attitudes towards pharmacological cognitive enhancement: safety concerns are paramount. PLoS One. 2010;5:e14322.

Einstellungen und Umgang von ÄrztInnen mit Neuro-Enhancement

Würden Sie als Arzt, als Ärztin einer gesunden Person, die nach Ritalin als Leistungshilfe vor einer wichtigen Prüfung fragt, dieses Produkt verschreiben? Dieser und ähnlichen Fragen geht eine Studie aus Zürich nach. Die befragten ÄrztInnen stehen solchen Produkten zurückhaltend bis ablehnend gegenüber, doch wird auch eine gewisse Ambivalenz in den Antworten sichtbar. Weiter konnte gezeigt werden, dass in den Praxen dieser ÄrztInnen nach solchen Produkten gefragt wird, wenn auch eher selten. Entsprechende Studien aus dem Ausland zeigen ein ähnliches Bild.

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Umfragen bei Studierenden zeigen, dass einige von ihnen Produkte für pharmakologisches Neuro-Enhancement (PNE) konsumieren.[1] Solche verschreibungspflichtige Produkte können u.a. von FreundInnen und KollegInnen stammen oder aber direkt von ÄrztInnen verschrieben sein. Die Einstellung der Ärzteschaft zu pharmakologischem Neuro-Enhancement und ihr Umgang mit diesen Substanzen wurde in verschiedenen Studien untersucht.

Umfrage bei ÄrztInnen in der Schweiz

Das Institut für Biomedizinische Ethik der Universität Zürich führte 2012 im Namen der Schweizerischen Akademie der Medizinischen Wissenschaften (SAMW) bei 1'600 ÄrztInnen in der Schweiz eine Umfrage zum Umgang mit pharmakologischem Neuro-Enhancement durch. Die Mehrheit der 376 antwortenden PraktikerInnen (Rücklaufquote 24,7%) aus den Bereichen Hausarztmedizin, Psychiatrie und Psychotherapie zeigten eine zurückhaltende und zugleich pragmatische Position.[2]

Die 1'600 ÄrztInnen wurden nach Kriterien wie Geschlecht, Dauer der Praxisjahre, Sprache (Französisch und Deutsch) sowie Fachrichtung (Psychiatrie oder Hausarzt- sowie innere Medizin) ausgewählt. Ein Fragebogen wurde entwickelt, getestet und während des Sommers 2011 zweimal an diese 1'600 ÄrztInnen versendet.

Fragebogen

Der Fragebogen enthält zu Beginn Fragen zu demographischen Daten, zum Begriff «Neuro-Enhancement» (NE) und zu verschiedenen Konzeptionen von Krankheiten und Behandlung. Darauf folgend ist eine Definition von «Neuro-Enhancement» gegeben: «die Verbesserung, «Optimierung» kognitiver und emotionaler Fähigkeiten mittels medikamentöser Substanzen beim gesunden Menschen.» Als Beispiel werden Methylphenidat (Ritalin®), Modafinil (Modasomil®), Antidepressiva oder Antidementiva aufgeführt mit dem Vermerk, dass weitere Substanzen unter NE verstanden werden können. Dies bedeutet, dass in diesem Fragebogen NE mit PNE gleichgesetzt wurde. Im Hauptteil des Fragebogens geht es um vier Fallbeispiele, die im nächsten Abschnitt näher erläutert werden.

Studienresultate deuten auf eine ambivalente Praxis

Die Antworten zeigten eine gewisse Ambivalenz: Die meisten ÄrztInnen stimmten der Aussage zu, dass das Vertrauen in die Medizin leiden könnte, wenn diese sich von ihrem Kerngeschäft – Kranke zu heilen – entfernte (63,3%). Trotzdem waren 39,4% der an der Umfrage teilnehmenden ÄrztInnen dafür, Neuro-Enhancement als Teil medizinischer Praxis zu akzeptieren. 54% erachteten den Einsatz von NE als Frage des individuellen ärztlichen Gewissens.

Auf der anderen Seite möchten zwei Drittel der Teilnehmenden die Situation im Einzelfall bewerten: «Grundsätzlich verschreibe ich nichts ohne Indikation. Ist der Leidensdruck aber gross und besteht beim Patienten der Wunsch, nichts unversucht zu lassen, so kann es sein, dass ich auch etwas ohne klare Indikation verschreibe. Dies hängt jedoch von der Substanz, Kontraindikationen und unerwünschten Wirkungen ab.» (Antwortkategorie im Fragebogen). Etwas weniger als ein Drittel wählten die Aussage «Wenn ich keine Indikation stellen kann, verschreibe ich auch nichts» und nur 4,6% entschieden sich für die Antwort: «Ich kläre den Patienten über allfällige Risiken des gewünschten Präparates auf und wenn er es dann immer noch möchte, so soll er es halt mal ausprobieren.»

Dieser Fokus auf den Einzelfall zeigte sich auch in der Beantwortung einer Frage zur persönlichen Haltung gegenüber Neuro-Enhancement: Fast die Hälfte der Teilnehmenden wählten die Antwort «Bei NE kommt es auf die Situation an: Ich sage nicht grundsätzlich nein.»

Die Fallbeispiele

Der Hauptteil des Fragebogens umfasste vier Fallbeispiele, in denen jeweils eine Person nach PNE fragt: ein Student, der ein Produkt für den «Schlussspurt» vor wichtigen Prüfungen wünscht, eine alleinerziehende Mutter, die ihre schwerkranke Mutter pflegt und nach einem «Aufputschmittel» fragt, eine schüchterne junge Frau, die gerne ein Mittel gegen ihre Hemmungen im Umgang mit Männern hätte sowie ein berühmter Wissenschafter, der Modafinil gegen Jetlag verlangt.
Nur im Fall der schüchternen Frau würde eine Mehrheit der ÄrztInnen ein Medikament verschreiben, falls therapeutische Alternativen nicht (genügend) helfen würden. Aber auch in den anderen drei Situationen war die Ablehnung der Verschreibung eines solchen Medikamentes nicht kategorisch.
Wichtig für die Verschreibung eines Produktes in den verschiedenen Fallbeispielen war für diese ÄrztInnen, dass der subjektive Leidensdruck gross ist, dass der Einsatz zeitlich begrenzt ist und dass Schlimmeres verhindert werden kann. Für die Mehrheit der ÄrztInnen nicht wichtig waren die zwei folgenden Antwortkategorien: Dass der oder die Betroffene nicht für die Situation verantwortlich ist, sowie ob das Ziel, das mit der Einnahme verfolgt würde, nachvollziehbar wichtig und wertvoll ist und allenfalls auch für Dritte positive Auswirkungen hat. Etwa je die Hälfte der Teilnehmenden stimmte bei der folgende Antwortkategorie zu respektive lehnte sie ab: Dass sich der oder die Betroffene genug angestrengt hat, um es aus eigenen Kräften zu schaffen.

Die Mehrheit der an der Umfrage teilnehmenden ÄrztInnen hatten Situationen wie die der alleinerziehenden Mutter und des Wissenschaftlers in ihren eigenen Praxen noch nie erlebt (58.0% bzw. 78.3%). Situationen, wie sie in den anderen zwei Fallbeispielen beschrieben sind, kannten etwa die Hälfte der ÄrztInnen aus ihren Praxen.

Zusammenfassend kann aufgrund der Umfrageresultate gesagt werden, dass in den Arztpraxen in der Schweiz selten nach PNE-Produkten gefragt wird und dass die Mehrheit der ÄrztInnen gegenüber einer Verschreibung eher zurückhaltend, aber gesamthaft nicht kategorisch ablehnend eingestellt ist.

Internationale Studien

USA

Ein ähnlich ambivalentes Bild zeigt eine Studie von 2011 mit Antworten von 633 US-ÄrztInnen (entspricht einer Rücklaufquote von 46,4%).[3] Die Mehrheit von ihnen hat Bedenken bezüglich Neuro-Enhancement, vor allem im Zusammenhang mit der Möglichkeit einer Verstärkung von sozialen Ungerechtigkeiten bezüglich Zugang zu solchen Produkten. Zugleich wünschen viele dieser ÄrztInnen, dass sichere und effiziente Produkte für PNE erhältlich sein sollten, doch nicht von der Krankenkasse bezahlt werden dürften. Dieser Widerspruch weist einmal mehr auf eine Ambivalenz bei ÄrztInnen bezüglich PNE hin und lässt vermuten, dass sich die ÄrztInnen der jeweiligen Argumente für bez. gegen PCE bewusst sind, jedoch nicht immer die gleichen Argumente für ähnliche Fragen berücksichtigen. Im Gegensatz zur Studie in der Schweiz haben bereits die meisten dieser ÄrztInnen (62%) in den USA Anfragen für ein PNE erhalten und immerhin teilweise etwas verschrieben (37% der ÄrztInnen, die eine Anfrage erhielten).

USA und Kanada

Eine weitere Studie wurde 2010 unter 212 ÄrztInnen in den USA und Kanada durchgeführt.[4] Ihre grössten Bedenken bei einer Verschreibung von Produkten für PNE galten möglichen Nebenwirkungen, welche nicht weiter ausformuliert wurden. Z.B. waren auch mögliche soziale Ungerechtigkeiten nicht erwähnt. Bei einer späteren offenen Frage nach weiteren die

ÄrztInnen beeinflussenden Argumenten erwähnten allerdings 5% der ÄrztInnen die Sorge vor Verteilungs-Ungerechtigkeiten, wobei aber auch hier mögliche Nebenwirkungen die meistgenannte Kategorie war (49%). Die Umfrage zeigte weiter, dass mehr ÄrztInnen einer 65-jährigen Person als einer 25-jährigen Person ein sicheres und effektives PNE-Produkt verschreiben würden. Nach den Gründen dafür wurde jedoch nicht gefragt.

Schweden

Eine Studie zur Einstellung zu PNE von 117 ÄrztInnen (entspricht einer Rücklaufquote von 39%) sowie weiteren 520 zufällig ausgewählten Personen (Rücklaufquote von 52%) wurde 2008 in Stockholm durchgeführt.[5] Beide Gruppen waren negativ gegenüber PNE eingestellt, die ÄrztInnen stärker als die zufällig ausgewählten Personen. Der Gebrauch von Produkten für PNE aus altruistischen Gründen wurde von den Befragten eher akzeptiert als die egoistische Verwendung. Dies wurde anhand der Frage eruiert, in der nach der Bewertung der Steigerung von Kapazitäten für (a) soziale oder (b) egoistische Zwecke gefragt wurde. Ein Beispiel für (a) wäre in unserer Umfrage das Fallbeispiel der alleinerziehenden Frau, die ihre kranke Mutter pflegt.

Niederlande

Für eine qualitative Umfrage führten die AutorInnen dieser Studie in den Niederlanden 15 Interviews mit HausärztInnen und ÄrztInnen für plastische Chirurgie sowie mit einer Fokusgruppe durch.[6] Ziel dieser Studie war es, die Bandbreite von Argumenten bezüglich einer «wunscherfüllenden Medizin» zu untersuchen. Der Fokus lag auf kosmetischen Interventionen sowie Diagnosetests ohne medizinische Indikation. Wichtig für die Entscheidung der ÄrztInnen waren die folgenden, aufgrund der Diskussion zu PNE in der Literatur erwarteten Argumente: Ob der Wunsch von der Person selbst kommt, das Abwägen von Risiko und Benefiz, wie stark der/die PatientIn von der Norm abweicht, ob die Krankenkasse dafür bezahlt oder nicht und falls ja, ob die Person funktionale Limitationen hat (falls die Person selber bezahlt, wurde mehr, aber nicht alles akzeptiert). Bisher noch nicht erwähnte Überlegungen, die für die Entscheidung wichtig waren, sind: Ob der/die ÄrztIn die Anfrage nachvollziehen konnte, wie das Verhältnis zwischen ÄrztIn und PatientIn ist sowie die Erwartungshaltung der Patientin, des Patienten. Interessanterweise wurden wichtige, in der Literatur aufgeführte Argumente nicht erwähnt: Konzepte zu Heilung vs. Enhancement und zu «suspekten Normen» fehlten in den Studienresultaten. Das heisst, es wurde nicht erwähnt, ob das, was sich die PatientInnen wünschen, eine Heilung oder aber eine Steigerung von normalen, körperlichen Eigenschaften ist, sowie ob es um die Erfüllung von «suspekten Normen» wie z.B. sehr grosse Brüste oder ein jugendliches Aussehen – auch noch im Alter – geht.

Ausblick

Die aufgeführten Studien zeigen, dass nach Produkten zum PNE gefragt wird, wenn auch nur selten. Die befragten ÄrztInnen stehen PNE zurückhaltend bis ablehnend, z.T. aber auch ambivalent gegenüber.

Eine Diskussion in der Gesellschaft ist also wichtig. Auf der einen Seite sollten die verschiedenen Meinungen und Ambivalenzen der ÄrztInnen geklärt werden, zum anderen sollten die Personen, die nach PNE fragen, ihre Bedürfnisse und Meinungen einbringen können und die Argumente gegen das PNE kennenlernen. Deshalb ist es wichtig, dass die ethische Diskussion, die in Fachkreisen zu PNE und zu «Human Enhancement» im Allgemeinen geführt wird, auch in der Gesellschaft Beachtung findet und dort fortgesetzt wird.●

Literatur

Asscher, E. C. A./Bolt, I./Schermer, M. (2012): Wish-fulfilling Medicine in Practice: a Qualitative Study of Physician Arguments. Journal of Medical Ethics 38(6): 327-331.

Banjo, O. C./Nadler, R./Reiner, P. B. (2010): physician attitudes towards pharmacological cognitive enhancement: safety concerns are paramount. Plos One 5. e14322.

Bergström, L. S./Lynöe, N. (2008): Enhancing Concentration, Mood and Memory in Healthy Individuals: An Empirical Study of attitudes among general practitioners and the general population. Scandinavian Journal of Public Health 36(5): 532-537.

Hotze, T. D./Shah, K./Anderson, E. E./Wynia, M. K. (2011): «doctor, would you prescribe a pill to help me ... ?» a national survey of physicians on using medicine for human enhancement. American Journal of Bioethics 11: 3-13.

Ott, R./Lenk, C./Miller, N./Neuhaus, R./ Biller-Andorno, N. (2012): Nneuroenhancement – perspectives of swiss psychiatrists and general practitioners. Swiss Medical Weekly.

Ott, R./Biller-Andorno, N. (2012): 6. Anwendungskontext Neuroenhancement. S. 44-56 in: Akademien der Wissenschaften Schweiz (Hrsg.), Medizin für Gesunde? Analysen und Empfehlungen zum Umgang mit Human Enhancement.

Endnoten

1 Vgl. den Artikel von Maier/Liechti/Schaub in dieser Ausgabe.
2 Vgl. Ott/Biller-Andorno 2012. Der vorliegende Text lehnt sich an diesen Beitrag an.
3 Vgl. Hotze et al. 2011.
4 Vgl. Banjo et al. 2010.
5 Vgl. Bergström and Lynöe 2008.
6 Vgl. Asscher et al. 2012.

5 Cognitive Enhancement and Productivity

5.1 Introduction

The main aim of this work is to look critically at the claim that increased productivity is a benefit of cognitive enhancers as it has been stated in literature on cognitive enhancement. Using the term 'productivity', the focus of this chapter is (1) to reveal that in the literature about cognitive enhancers (CE), an assumption is sometimes made that productivity is necessarily a good thing, and (2) to indicate why we should be critical of this claim. In the literature on cognitive enhancers, different authors have highlighted that such products could be used to fulfil unjust or undesirable social norms. I want to specify such a concern by focusing on possible influences of the social structure on our understanding of productivity. For that, I will analyse the connection between the evaluating of cognitive enhancers and productivity as well as between productivity and the social structure we live in. By highlighting social norms, which could influence our evaluating of productivity, I want to challenge the claim made in the literature of CE of simply assuming that increased productivity is desirable. I ask for a discussion about these social norms if we want to support and reinforce them by adapting ourselves to them or if we rather want to subvert or supplement these social norms. This way we can decide if we want to use such a claim about increased productivity in favour of CE in the debate of weighing up different ethical values against each other deciding if cognitive enhancement is a good or bad thing to do.

I want to point out that this argument states only that the system we live in, in our case late capitalism, could have an influence on our understanding of productivity. Because of such a possible influence, we ask for a critical view on the claim that increased productivity is per se something desirable and seen as a reason for taking CE. I am aware that other arguments in favour of CE exist that are not based on increased productivity and can therefore most probably not be linked to late capitalism at all, or only less directly. For example the argument about the reduction of valuable human diversity when being able to control how we are along with the lack of imagination regarding how various we could be [51].

Neither do I want to criticize productivity in itself. When looking at various definitions given in dictionaries, I conclude that productivity is mostly understood as work productivity, defined as output divided by work input [111, 112]. Rarely, a creative definition of productivity is included, which is very close to the opposite of work productivity. The main difference between work productivity and creative productivity is: Work produc-

tivity is focusing on the input in relation to the output whereas creative productivity looks only at the output, independent of the input. The quotes given above about CE and productivity can relate to work or to creative productivity. Does it refer to e.g. an academic who finds a new solution to a problem (creative productivity) or a worker on the assembly line, who is taking Modasomil for being able to cope better with shift hours (work productivity)?

Allen Buchanan defined productivity in the broad sense as "how good we are at using existing resources to create things we value" [113, p. 44]. He explicitly does not want to reduce productivity on such a narrow definition as the "efficiency in the production of economic goods" [113, p. 44]. He states that increased productivity in such a narrow definition does not guarantee increased well-being, because it can be that the things we value economically turn out not be good for us. This is exactly what I am asking for – a careful use of the term productivity as done e.g. by Allen Buchanan. What I want to indicate for being critical about it is seeing increased productivity as desirable by seeing ourselves as "entrepreneurial self" [114]. Taking CE would in such an understanding increase our productivity leading to more output and therefore more success, which is than linked to a higher quality of life. In this chapter, I will analyse each of these steps of such a connection of productivity and quality of life in relation to late capitalism and provide reasons for a more critical view of such an understanding.

5.2 The Assumption about Productivity

Different definitions exist for the well-known term 'cognitive enhancement'. I will work with a slightly adapted definition deriving from a frequently quoted paper of Greely et al [5]. Our definition of cognitive enhancement is the following: The usage of medications used to treat psychiatric and neurological conditions for improving directly the cognitive performance standing for the improvement of the short- and long-term memory as well as effects on the executive functioning of a healthy person.' These medications are standing for the so-called CE. I will focus here on arguments raised in the field of cognitive enhancement in relation to increased productivity but will integrate arguments raised in the broader debate about human enhancement. The reasons given here for a critical view also apply for human enhancement in general, if similar claims to the once observed in the context of CE are made.

In the same paper of Greely et al [5] was an argument given for the usage of CE. The authors claim that "In a world in which human workspans and lifespans are increasing, cognitive enhancement tools - including the pharmacological - will be increasingly useful for improved quality of life and extended work productivity, as well as to stave off normal and pathological age-related cognitive declines. Safe and effective cognitive enhancers will benefit both the individual and society." Other authors in the field of cognitive enhancement proposed that: "We can expect greater productivity or more creative and intellectual breakthroughs, which is why individuals would want to be enhanced in the first place." [115]. Productivity is mentioned in several chapters of the book edited by Julian Savulescu and colleagues on enhancement [116]. In the various essays of this

collection, increased productivity is seen unquestionably desirable and not scrutinised in itself.

Henry Greely and colleagues state the effect of CE of increased productivity on the same level as improved quality of life. The authors see an extended productivity as something that is good in itself and therefore something desirable and an argument for the usage of CE. Other authors say that increased productivity is good because it leads inevitably to increased quality of life. This is done explicit by e.g. Martha Farah [117] or more implicit as I understand the argumentation given e.g. by Allhoff et al [115].

The main question here is not, if the products actually lead to an increased productivity. What I want to address here is the assumption that an increased productivity is something desirable. The concerns raised in the quoted papers are about the safety, freedom and fairness of increased productivity by means of CE but the assumption about productivity being a good thing is not questioned.

5.3 Why We Should be Critical about this Claim

For showing why I ask for a critical view of such a claim about the positive evaluation of increased productivity, I will first focus on 'social structure'. In a second step, I will look closer at social norms about productivity for than being able to elaborate possible influences of the social structure we live in, namely late capitalism, on our understanding of productivity.

Various definition of social structure exists and are based on the work of social theorists from Herbert Spencer in 1873 and later mile Durkheim in 1893 [118, p. 12f], through Talcott Parsons and others in the 1940ies to the 60ies to Claude Lévi-Strauss (1968), Michel Foucault (60ies and 70ies) and Pierre Bourdieu (70ies and 80ies). José López and John Scott attempt to address these diversities and develop a clear and explicit concept of social structure[118]. For our work, the more general parts of these various definitions focusing on the common features of social structure will be sufficient. Referring to the online version of 2012 of 'the Oxford Dictionary of Sociology' by John Scott and Gordon Marshall [119], social structure is defined as "a term referring to any recurring pattern of social behaviour; or, more specifically, to the ordered interrelationships between the different elements of a social system or society. [...] The core institutional norms and meanings are cultural phenomena that exist only as shared ideas and representations in the minds of individuals. For this reason, socialization into a culture is central to the maintenance of a social structure" [119]. For testing if such influence of the social structure on values and norms of the individuals could exist, one can look at real life situation. A population should be at best split into two and then exposed to different social structure and, to see an influence of another social structure once again, being reunited afterwards. A situation like that existed in Germany. For example a comparison of Eastern and Western Germany focusing on institutional changes and the attitudinal changes revealed that: "New institutions create new normative expectations that lead to new attitudes towards public policies [120]." Such real life events do not give clear experimental data, but it gives some evidence that the social structure can influence the

attitudes and social norms of the individuals living within it.

In sum, the social structure refers to any recurring pattern of social behaviour. These behaviours are influences by social norms that exist as shared ideas in a culture to which we get access by socialisation into the culture. In am going to consider some of the key work so far on social norms and CE or human enhancement in general in the following paragraphs.

Nikolas Rose has mentioned this aspect of careful analyse in the context of CE [121, p. 41]. He argued that when we use technology to adapt to a work regime, we should carefully analyse if the system we adapt to is acceptable or intolerable. If the latter is true, than we should change the working conditions for humanize work rather than changing the employee. An example is the use of video conferencing rather than taking Modafinil to overcome jetlag [121, p. 41]. But the use of e.g. video conferencing emphasises the position of humans as components of a system [121, p. 41]. So even if we prefer to change working conditions rather than the employees themselves, we have to carefully consider as to whether this is acceptable. The working conditions provide employees with a range of activities and interactions for an appropriate balance of stress and intellectual demands. Additionally, employees have to have adequate levels of control over their work [121, p. 41]. An example that is given is the need for sufficient breaks for air traffic controllers. CE as concentration aids could also allow these employees to work better for longer, but a system that relies on such CE may have negative impacts on the jobs. Such impacts are that such jobs are less satisfying and with a higher risk of failure mechanisms as well as long-term risks to health and well-being according to prolonged exposure to demanding working conditions [121, p. 41]. Taken together, the authors of report on human enhancement and the future of work [121] state by referring to Nikolas Rose that changes of the employees or of the work environment have to be carefully considered if they are acceptable. This is only the case if employees have an appropriate balance between stress and intellectual demands, have some control over their work and not having any long-term risks to health and well-being according to prolonged exposure to demanding working conditions.

Margaret Little wrote about social norms and human enhancement in general by presenting three case studies about (1) a man who wants to have a double chin because this is seen in the society he lives in as beautiful; (2) a boy who wants his ears that stick straight out by surgery closer to his head; and (3) a black man wanting to have surgery to look more like a white person and a healthy woman who wants to look like a supermodel [52]. Margaret Little concludes that the social norms of appearance behind the third case study are unjust. The author mentions two main reasons for such a conclusion of seeing the third case as morally problematic. Firstly, that the cost society imposes on individuals if they are failing to life up to such norms of appearance are 'excessive, punitive, unfair or cruel' [52]. Another important source of moral unease about such surgeries are that the very content of such norms about appearance are morally suspect. Such content are the broader system of attitudes and actions by which the norms of appearance are grounded in or get life from.

Maartje Schermer and her colleagues adapt the examples of Margaret Little to the

context of CE [53]. The authors ask if such unjust attitudes and actions like racism and sexism behind norms of appearance are also playing a part in the context of CE. The authors conclude that these kinds of suspect norms are not applicable in the context of CE. They are giving examples of other norms in the context of CE like the society's emphasis on cognitive performance, 24/7 economic activity, or individual happiness. Maartje Schermer and her colleagues conclude that 'it would be difficult to argue that these norms are unjust' but that some norms might be undesirable for other reasons like adapting workers to the demands of employers and society. I agree with Maartje Schermer saying that it is not primarily sexism or racism making these norms in the context of CE unjust. But I assume that an analogy to such discriminating attitudes as sexism or racism behind such norms in the context of CE can be drawn. Calling the discrimination on the basis of one's concentration and alertness ability 'neuroableism', one could argue that there are unjust attitudes behind the norms in the context of CE. Therefore for calling the norms in the context of CE unjust analogue to Margaret Little in the context of norms around appearance, one has to shown that such discrimination is taking place. I will focus on that point in section 5.4.3.

Dieter Birnbacher mentions this problem about complicity in his essay from 2006 where he argues that we have to look at the expectations of society when looking at cognitive enhancement [122]. A successful adaption of an individual to a social norm could be the fulfilment and confirmation of a norm without which the society as a whole would be better off. This argument highlights the aspect that the interaction between social norms and us goes in both directions; our behaviour influences the establishment, maintenance or transformation of social norms and our behaviour is in turn influenced by the social norms.

Such a questioning of some social norms rather than adapting to them has also been raised in the quote above of Rose [121, p. 41] as well as by Claire Bambra [123]. Bambra gives the following two examples: 1) the adaptation to shift work rather than rethinking such work; 2) the increase of employment rates of people with a disability or chronic illness by targeting the individual rather than changing structural barriers such as the workplace design or the working hours [123, p. 193].

These authors support my suggestion of a critical view of the claim regarding increased productivity by looking at the social norms behind such a claim. The authors recommend questioning the fulfilment of certain social norms if the attitudes and actions behind them are 'unjust' [52], 'undesirable' [53] or if the society would be better off without these social norms [122]. In section 5.4.1, I will give reasons for assuming norms behind the evaluation of increased productivity as desirable and will focus in section 5.4.3, under which circumstances these norms are unjust, undesirable or without them we would be better off.

Many authors have identified the social structure we currently live in as 'late capitalism'. This particular social structure has a strong influence on our understanding of work and therefore of productivity. As stated by Tilly and Tilly in their book on 'Work under Capitalism', labour markets that emerge in different social structure like e.g. state socialism or mercantile capitalism operate in different ways because of different princi-

ples or organization and interpersonal networks as well as different shared memories, understandings and expectations [124, p. 138]. Furthermore, the authors conclude that the relative salience of the goals of quality, efficiency and power depend on the task at hand as well as on the culture being defined as the shared understandings and their representations [124, p. 258]. In the following I want to show that these definitions of labour markets and the influence of culture on efficiency by Tilly and Tilly combined with previous definitions lead to the conclusion that the social structure we live in can influence our understanding of work as well as our understanding and evaluating of productivity.

As I have mentioned earlier, productivity is mostly defined as output divided by work input. Tilly and Tilly define efficiency as large output for small inputs [124, p. 84]. Therefore efficiency is a synonym for increased productivity. The term 'culture' was part of the definition given above about social structure where 'socialization into a culture is central to the maintenance of a social structure'[119]. Together with the connection given by Tilly and Tilly that culture influences the relative salience of the goals on quality, efficiency and power, this leads to an influence of social structure via culture on weighting of efficiency compared to quality and power.

Tilly and Tilly, who said that labour markets emerging in different social structure operate differently, have given the connection between the social structure and the labour markets. Taken together, the authors are therefore complied with my underlining premise of the concern that the social structure we live in can influence our understanding of work as well as our understanding and evaluating of productivity.

5.4 Lets be Critical about this Claim

If it is the case that the social structure we live in does at least in parts influence social norms, then this could influence our evaluation of productivity. This in itself does not ask for a critical view of the claim about evaluating increased productivity as desirable. But when adding the premise that the attitudes and actions behind some social norms are unjust [52] or undesirable [53] or without some social norms the society as a whole would be better off [122, 123], the situation is different. Than it would be a necessary condition to analyse the social norms behind such a claim more carefully if we do not want to adapt to unjust norms or to such norms without which we would be better off.

To do such an analysis, I first want to focus on why I assume that there is a social norm behind the claim that increased productivity is good. I then look at our understanding of social norms concerning the body and will link this to the understanding of productivity in late capitalism and its connection with our desire to increase the quality of life. I focus here on late capitalism seeing it as the social structure the authors of the claim as well as we are living in. After showing some possible influences of late capitalism on our understanding of quality of life, I will focus in 5.4.3 on circumstances in which such a social norm about our understanding of seeing increased productivity as desirable could be unjust or undesirable.

5.4.1 Social Norms

Social norms are "common standards within a social group regarding socially acceptable or appropriate behaviour in particular social situations, the breach of which has social consequences. The strength of these norms varies from loose expectations to unwritten rules" [125]. Due to the fact that different authors mentioned the valuing of increased productivity as something desirable without giving reasons for such a claim seems to give reasons for classifying it as 'loose expectations'. What sort of social norms could lead to such loose expectations is discussed by Paula-Irene Villa.

As she states in her essay [126, p. 138], the lack of medical or other experts telling us what we have to wear or which sport we should do has been replaced in the social structure we live in by the mantra of overcoming the own imperfection. Iris Ritzmann wrote in her essay that the norm is to be young, beautiful and in many cases male. For being seen as normal and healthy, one has to adapt oneself to this idealized norm [105, p. 33]. In such a social structure, I will show in the next paragraph that the usage of CE to increase one's productivity could be seen positively as reaching the ideal of oneself.

Peter Miller and Nikolas Rose wrote in their essay that we see ourselves in 'advanced liberal democratic societies' as entrepreneurs with the goal of maximizing our quality of life by building ourselves a life style out of material goods [127]. By buying the 'commodities' which have been attached with a 'personal' meaning by advertisement, this commodities will "glow cast back upon those who purchase it, illuminating the kind of person they are, or want to become" [127, p. 25].

The worker, according to the authors, is not anymore construed as a social creature that wants to satisfy her or his need for security, solidarity and welfare. But we now see us as individuals with the goal of maximizing our success and achievement by actively shaping and managing our life. When seeing ourselves as entrepreneurs, then our personal success and achievement themselves may become synonymous with enhanced productivity and the fostering of innovation through the active self-fulfilling impulses of us as employees [127, p. 26].

Grit Höppner and Sigrid Schmitz give evidence for such an understanding of us as entrepreneurs by analysing 21 journal articles between 2006 and 2011 concerning cognitive enhancement [128]. The articles were published in one of the following four German online-portals of 'Spiegel Online', 'Zeit Online', 'sueddeutsche.de' and 'stern.de'. The goal of this survey was to investigate the debate about pharmacological enhancement in the media and focusing on gender relevant assumptions concerning terms like 'performance and success society', personal responsibility', 'productive efficiency' and 'emotionality'. Höppner and Schmitz write that CE have been described as tools to support the "entrepreneurial self" [114]. Höppner and Schmitz criticize that in these articles are only seldom asked for a reflection of the social development. The authors assume that CE can treat the symptoms, but cannot resolve the source of increased pressure for success [128]. As seen above, success is a synonymous for increased productivity [127, p. 26]. Grit Höppner and Sigrid Schmitz conclude that the analysed media communication one main message: For being successful and competitive, CE seems useful for both gender to optimize oneself. Or in the words of Degele and Schmitz: The alignments

of efficient skills of 'capitalism compatible bodies' [129]. But Grit Höppner and Sigrid Schmitz state that this aspect to optimize oneself is based on a gender specific difference where masculinity is linked to above-average productive efficacy and rational abilities, whereas femininity is linked to average productive efficacy and short-sighted success as well as emotional enhancement for an emotional regulation. The authors conclude such a difference according to the frequent quotation mentioned in the publication of the survey among German employees [3] that men are more often taken CE to increase their concentration and the capacity for remembering, whereas women are more often taken CE that enhance mood and minimize feelings of fear. Grit Höppner and Sigrid Schmitz criticise that such findings are not critically reflected. They conclude from their analysis that it is stated in the media that men are using CE occasionally for keeping the ideal level of productive efficacy whereas women need a regular use of CE to keep up on such a level, the optimising paradigm about CE reproduces gendered capabilities and mental states. They would most probably agree with Maartje Schermer saying that sexism is not an underlying attitude on which norms about the use of CE are based on because both gender are taking CE. But the reasons mentioned for such an intake are influenced according to Grit Höppner and Sigrid Schmitz by prejudices about gendered capabilities and mental states.

Miller, Rose, Höppner and Schmitz support our claim that in late capitalism an increased productivity is seen as a personal ideal and that we want to achieve it among other things for maximizing our success. And this goal of maximizing success is itself linked to our desire for 'optimum personal happiness' [127, p. 28]. Optimal personal happiness is equivalent or at least part of the understanding of human flourishing that is a synonym of the term 'quality of life'. Therefore, having now the line that we want to increase our productivity for maximizing our success and achievement for increasing our happiness. Happiness can be seen a part of human flourishing, which is a synonym for the quality of life.

In the next section I focus on quality of life and how late capitalism could influence our understanding of it. This will be a summary focusing on its understanding deriving from the one of increased productivity but will also contain new aspects of an influence of the social structure we live in.

5.4.2 Quality of Life

When looking at the international cross-culturally comparable assessment instrument developed by the WHO in 1991 for measuring the quality of life [130], further possible fields where the social structure we live in could influence our understanding of quality of life can be observed. The questions of this measuring instrument being of interest in relation to human enhancement and late capitalism are about 1) the meaningfulness of ones life, 2) the acceptance of ones bodily appearance, 3) the opportunity for leisure activity, 4) the satisfaction about ones capacity for work and 5) the satisfaction of oneself. These five questions being part of the quality of life instrument are the ones I think are important when discussion the influence of the social structure on our evaluation of increased productivity in relation to quality of life.

The meaningfulness of ones life is linked to our desire for a better world. One has to be able to imagine a meaningful life to compare it to the current life one has. Such an imagination is an important part of being able to dream of a better world. A thesis present in the field of research on utopia from a sociological perspective is that our desires for a better world are captured by late capitalism [131]. Zygmunt Bauman describes happiness in our social structure of modernity as the following: Happiness as something that is thought as an aim one has to reach individually and is seen as a series of happy moments succeeding each other and not anymore as a steady state and therefore unlike the utopian model of a good life [131, p. 23]. He concludes that "the desire for a different today has elbowed out concern with a better tomorrow" [131, p. 24]. Examples for such an understanding of desire were given by Paula-Irene Villa of an ideal self concerning the body [126, p. 138] and by Peter Miller and Nikolas Rose about the desire for happiness linked to success and achievement [127]. If such an understanding of happiness is true and is not only the case for modernity but specifically for late capitalism, then we are not able to dream of a better world anymore. This is because our desire for a better world has been captured by late capitalism and turned into a desire for maternal goods as well as success and achievement.

The acceptance of ones bodily appearance, another question in the WHO questionnaire about the quality of life, was discussed above concerning social norms and the body. As stated by Paula-Irene Villa as well as Iris Ritzmann, we orientate ourselves towards norms of an ideal bodily appearance. Therefore, this question related to our social norms about the body is, according to Villa, influenced by late capitalism in which an athletic body is used for demonstrating discipline, mobility, flexibility and autonomy [126, p. 138]. Taking these two points about ideal norms and the influences of them by late capitalism together, the conclusion is that late capitalism influences how we see our bodily appearance.

The third question of interest in relation to human enhancement and late capitalism is leisure activity. It has not in itself to do with capitalism but the term is linked to work, CE and productivity. The data of a survey among students of the University of Zurich [132] revealed that one of the two reasons why these students took or could imagine taking cognitive enhancers was that 'I could finish much of my work in less time and would therefore have more leisure time and less tress'. This would only be true, if the goal one has or wants to fulfil is finite. Otherwise, the goal of work would just increase leaving the same amount of leisure time as before taking such cognitive enhancers (and impose a social pressure for all employees to take such cognitive enhancers for reaching the now increased goals). Looking at the increases in efficiency since industrialization and our current working hours, I conclude that our working hours would be less by today than they are if the working load would be more or less fix. This leads me to the assumption that there is no steady state of working goals but that they grow with increased efficiency and are therefore relative and not absolute.

The fourth question I want to focus on out of the measurement tool of the WHO is about the satisfaction about ones capacity for work. As stated by various authors, work maintains a successful capitalist economy and reinforces capitalist relations and is

therefore promoted as a ideologically good thing as written e.g. by Claire Bambra [123, p. 4]. One of the negative points of such a view can be seen when a person lacks paid work (does not want to or cannot) leading to stigmatisation [123, p. 4]. Therefore the inclusion of this question in a catalogue for evaluating our quality of life is in itself most probably influenced by late capitalism where being able to work is seen as a good thing. Additionally, work leads in late capitalists society to income. So at least in societies with no or inadequate unemployment welfare, the relationship between the quality of life and the own capacity for work is based on economic reasons.

The last question of the WHO is about how satisfied one is with oneself. The answer to this question is in my view influenced partly by the answers one gives to the previous discussed questions about the meaningfulness of life and the acceptance of ones bodily appearance. Therefore, having shown that the answers to these two previous questions are influenced by late capitalism, one can deduce a secondary influence on this question about how satisfied one is with oneself. I am aware that many other aspects most probably exist, which influence the answer to this question but at least some influences derive from the social structure we live in.

Taken together, some of the questions of the WHO questionnaire on the quality of life can be influenced by the social structure we live in as well as our evaluation of increased productivity. This leads us to the conclusion that our understanding of quality of life is also influenced by the system we live in.

5.4.3 Evaluation of the Social Norm about Productivity

I have elaborated the influence of late capitalism on social norms about our body in relation to productivity and on our understanding of a flourishing life. As stated above, such an influence in itself does not ask for a critical view of the claim about seeing increased productivity as desirable. But when adding the premise that the attitudes and actions behind some social norms are unjust [52] or undesirable [53], that the costs on individuals if they are failing to live up to the norms are excessive or cruel [52], that the system we adapt to is intolerable [121, p. 41] or that without some social norms the society as a whole would be better off [122, 123], the situation is different. Than it would be a necessary condition to analyse the attitudes and actions behind such a claim more carefully. In this section, I want to analyse if this is the case in the context of being in favour of CE because such products can increase ones productivity.

Social norms that could lead to our loose expectation of increasing productivity are, in a nutshell, about overcoming our imperfection by imaging our ideal equal to successful entrepreneurs [126, 127, p. 138]. It is possible that we think such an overcoming of our imperfection and becoming successful entrepreneurs is increasing our quality of life and that our desire for a better life is captured by such a wish.

Therefore one of the main questions is, what are the costs on individuals and their attitudes to increase their productivity to overcome their imperfection or becoming successful entrepreneurs? To focus on possible attitudes and costs, I will look at the example of work. As mentioned previously by Miller and Rose, when seeing ourselves as entrepreneurs, then our personal success and achievement is a synonym for enhanced

productivity [127, p. 26]. Additionally, the quotes in section 5.2 about CE and the claim of increased productivity as desirable are often discussed in reference to work. These two reasons are why I will focus on work in the following.

The costs of not working is stigmatised e.g. [123, p. 4]. But are the costs of so-called 'neuroableism' in relation to work as excessive, punitive, unfair or cruel as for racism or sexism? 'Neuroableism' was defined as the discrimination based on concentration and alertness ability. These functions can be improved with CE according to Henry Greely and others to increased productivity. An example for such exclusion based on neuroableism is that being not very good in concentrating leads to a lower education level (of course many other reasons can lead to the same output). This does often result in taking up jobs, which are less respected in society and containing also lower wages. The difference to exclusion according to skin colour or gender is that for at least some of these jobs the ability of being able to concentrate is a necessary requirement for fulfilling the job. But the question remains if we support or even increase discrimination on the basis of neuroableism by taking CE to increase our productivity. This would be the case if we support unjust attitudes underlying such social norms when evaluating increased productivity positively. Taken together, the main question is: When is exclusion based on neuroableism unjust? Or in the words of Dieter Birnbacher, when would we be better off not focusing on increasing productivity anymore but rethinking the strong focus on the abilities of concentration and alertness?

In the following, I will give a possible answer based on the theory of justice of John Rawls. He stated that social and economical injustices are only acceptable if they are for the greatest benefit of the least-advantaged members of society and if these offices and positions are open to everyone under conditions of fair equality of opportunity [133, p. 81]. John Rawls states that humans with the same abilities and the same willingness should have the same chances of success [133, p. 93]. These abilities like intelligence or physical strength are distributed in society by chance [133, p. 29] and such a natural and unequal distribution is neither just nor unjust but a natural fact. What can be just or unjust are the ways in which institutions act in the light of these facts [133, p. 123]. In the context of concentration and jobs would that mean that such inequalities in wages are only just if the person being worst off in a society is better off having such inequalities compared to not having them. And also that people of the same abilities have equal access to CE as well as education. Otherwise the system has to be changed. I do not want to get here into the field of various social justice theories. What I want to point out is that exclusion on the basis of the ability of concentrating is according to John Rawls not in itself just or unjust but it depends on how the society builds on such abilities. The same can be applied for the claim that increased productivity is a benefit. Only if the use of CE according to increase productivity is leading to an improvement of the life of the persons being worst off in a society, than there is no objection based on the theory of John Rawls. But if it is the case that some of the people belonging to the worst-offs in a society are not as productive as others, then it could be that the pressure on them increases to become more productive. If such pressure leads to a worsening of the situation these people are in, than such a claim would be unjust. This view is

similar to the one of Margaret Little focusing on the cost of the ones not fulfilling a specific norm.

Taken together, the possible social norms influencing our positive evaluation of productivity to overcome our imperfection or to become successful entrepreneurs could be unjust. This would be the case if the underlying attitudes are unjust or undesirable e.g. if such norms reinforce discrimination based on concentration and alertness ability or if the costs for individuals not fulfilling these norms are excessive, punitive, unfair or cruel.

5.5 Conclusion

The main aim of this work was to look critically at the claim that increased productivity is a benefit of cognitive enhancers as it has been stated in literature on CE. An increased productivity wants to be reached by increasing concentration and alertness. Asking for such an increase could reinforce discrimination on the basis of these abilities I have called 'neuroableism'. If our wish of increased productivity is based on undesirable social norms [53], we should be careful using this claim as an argument in favour of CE. Such undesirable social norms in the context of productivity being influenced by late capitalism could be the wish to overcome our imperfection by imaging our ideal equal to successful entrepreneurs.

According to these possibilities of acting on unjust or undesirable social norms when being in favour of the use of CE to increase productivity, I ask for a careful use of this claim. There are for sure additional social norms influencing such a claim about productivity next to overcome our imperfection or to become successful entrepreneurs. It is important to identify, examine, question, challenge and at the end to try to subvert or supplement these social norms if necessary. Being reflective about one's position, assumption and unquestioned framework behind such a claim enables us to exclude the reinforcement of unjust social norms. This is why I ask for a critical debate about what sort of social norms around increased productivity we want to reinforce when using the claim about a positive evaluation of increased productivity in the discussion around CE.

6 Conclusion

Since 2001, a number of surveys about the usage of cognitive enhancers (CE) have been accomplished in different countries. Table 1.2 (p. 21) contains 14 surveys among students or the general public with at least 500 participants. In this selection are also included three surveys among physicians not asking about their usage of CE but about their handling with requests for CE and their own attitudes about CE.

When starting my Ph.D., no data about the situation concerning the usage of CE in Switzerland were available. We launched two surveys, one among 1765 students of the University of Zurich (Chapter 2) and the other among 379 physicians in Switzerland (Chapter 3). We explored attitudes and the handling of requests for CE.

The survey among students revealed that 6.2% of the participants have taken Ritalin®, Adderall®or Modasomil®at least once in their life as a healthy person. For study purposes meaning for the preparation time or for the exam, 4.7% of the participants have used a CE and most often Ritalin®and more than five times in their life (almost half of the 'CE-users'). The knowledge about a possible use of Ritalin®as a CE was widespread and almost 3/4 of the participants knew of it. The most common reasons for a usage for the CE-users were to be more concentrated (about 3/4 agreed) followed by out of curiosity as to how it takes effect and to be more awake. Most of the CE-non-users could not imagine a use of CE at all or rather not (almost 70%). The other 30% chose most often the same three reasons as the CE-users but with 'out of curiosity as to how it takes effect' as the most common one.

When asking about side effects, the CE-non-users categorized them more often as rather critical or very critical for Ritalin®compared to the CE-users. The CE-non-users formed their opinion of the side effects most often by reading about CE in the media whereas the CE-users by reading specialist literature. This is surprising because analyses of the presentation of CE in the media have shown that the negative side effects are less often mentioned compared to the positive effects of CE (see Section 1.1) [2, 4]. A possible explanation could be that the CE-users have chosen the answers they thought are more appropriate as e.g. having to be well informed when using such CE.

When asking the participants about reasons for taking CE and concerns about CE, both groups chose the same three respectively two statements most often. Out of six reasons, the three most often chosen statements were about finishing much of the work in less time, learning more quickly and regaining lost mental vigour. The values of agreement for the CE-users were about twice as high compared to the values for the CE-non-users. The opposite distribution was found for the concerns. The values of

agreements for the CE-non-users were about 1/4 to 1/3 higher than the values for the CE-users. The two concerns out of ten concerns where the most of the participants agreed were about possible side effects and about finding the goal to achieve more of these CE questionable. The third most common concern for the CE-users was about that these products represent an unnatural interference with our bodies and for the CE-non-users about the gut feeling telling oneself to keep the hands off such products.

These results were the first ones about students in Switzerland including questions about ethical considerations. The results of our surveys are discussed in comparisons with other surveys about the use of CE among students or the public in the publication (p. 35) and in comparison to the other survey accomplished among students in Switzerland [74] in section '2.5 Conclusion' (p. 68).

With the data of the survey among physicians in Switzerland, we looked from a different angle at the use of CE. The main goal was to ask general practitioners and psychiatrists in Switzerland about their familiarities of requests for CE and their willingness to prescribe such products. Four case scenarios were presented about a student, a single mother, a shy young woman and a scientist. The most common answer when asked about prescribing something or not was in all four case scenarios that one would only prescribe a drug if no therapeutic alternatives were available. Around 1/3 of the participants who would prescribe a drug either for sure or if no therapeutic alternatives were available chose beta blockers in the first scenario and Modasomil®in the fourth scenario. Around 40% of the participants who would prescribe a drug chose antidepressants in the second and in the third scenario (Table 4 of '3.2 Publication'). When asked if the participants do know of such request from their own work, the highest value of agreement was found for the case scenario about the student followed by the one about the shy women. Both scenarios were known by a bit more than half of these physicians. About 40% of the participants have been confronted with the case scenario of the single mother and about 1/5 with the one about the scientist. One out of 10 participants knew all three case scenarios from their workaday life and about 2 people have not experienced any of them. The frequency of such request were most often 1-2 times per year for case scenario one, two and three and even less for the fourth scenario.

When asked about their personal attitudes towards CE, most of the participants were unsure if they would count themselves among those who principally oppose CE. But also less than 10% would embrace a consumer model (Table 6 of '3.2 Publication'). More than half of the participants agree to the statement that every physician should decide for her- or himself if she or he wants to practice CE or not (Table 8 of '3.2 Publication'). This ambivalence and uncertainty regarding the opinion about the prescription of CE is in line with surveys done in the US and in Canada and is discussed in the publication.

In sum, people requesting for CE are approaching physicians in Switzerland but not very often. But as seen in the survey among students did more than 2/3 of the CE-users receive the product from friends or family members and only a bit less than 1/4 from a physician. The physicians themselves did most often neither agree nor disagree completely to the prescription of CE but rather decide on a case-to-case basis. On the other hand revealed our survey among students that some of them are taking CE for

study purpose but much less as it might appear in the media. These results are in line with previous studies done in Germany and in Switzerland.

The two surveys can add knowledge to each of the three steps of ethical reflection according to Pascal Borry and his colleagues [43] (Section '1.4 Ethics and Empirical Data'). In the following, I will look at the contribution of these two surveys to each step. Answers to the first step about describing the current situation is achieved by data about which people do take under what circumstances CE or prescribe such products. The second step of ethical reflection is about the assessment of the moral questions concerning the integration of principles, norms, virtues and values when judging the use of CE. As categorized by Martha J. Farah and her colleagues, four main categories of arguments exist in the field of CE: Arguments about safety, about social pressure, about distributive justice and about what it means to be a person and the value of achievement (Section '1.5 Ethical Considerations'). When grouping the concerns asked about in the survey among students according to these four categories, one gets the following four categories: About safety are the concerns about side effects, about addiction and about gut feelings. The concern about social pressure is the more general one about the bad influence on society, which can also be grouped to the third group about distributive justice next to the concern about betraying others. The concerns about what it means to be a person and the value of achievement are the followings: About the pressure to achieve more, about an unnatural interference, about the gut feelings (also part of concerns about safety), about not being myself anymore, about not being able to be proud of achievements anymore and about God's plan. The highest value of agreement for the 1797 students was seen for the concerns about safety and the one about an unnatural interference of the concerns about what it means to be a person.

The ranking of the concerns are not in line with the results of the survey done by Ferenc Biedermann [72]. He established these ten concerns according to literature, media and open interviews. The 291 participants of a German-speaking city in Switzerland agreed most often to the three concerns about an unnatural interference, about the gut feelings and about not being myself anymore. Therefore these persons agreed mostly to concerns about what it means to be a person.

When focusing on the physicians, questions about which criteria influence their decision regarding the prescription of drugs and well as the evaluating of statement give insights into their assessment of the moral questions. But these statements and criteria cannot be grouped according to the categories of arguments in the field of CE.

The third step according to Pascal Borry and his colleagues is about the evaluation. This step is mainly hypothetical conerning the use of CE in Switzerland, because no specific regulations about CE have been implementend recently. In general, on can say that this step is better accessible with qualitative interviews compared to quantitative surveys. Still, some of our questions among students about where they received the CE from can give some insights into aspects about safety and the possible effects of regulations.

Taken together, the data of these two surveys can contribute to ethical reflections. A more theoretical approach to ethical reflections are the examinations of specific argu-

ments in the field of CE. This is what I did in the additional project within my Ph.D. (Chapter 5). The main aim was to look critically at the claim that increased productivity is a benefit of cognitive enhancers as it has been stated in literature on CE. My argumentation is based on arguments not being part of one of the four categories of Martha J. Farah and her colleagues but added by a recent paper addressing the arguments in the field of CE [50]. These arguments were formulated by Margaret Little, Maartje Schermer, Nikolas Rose and Dieter Birnbacher and on social norms in relation to human enhancement or specifically to CE. The authors assume that some social norms might be undesirable, unjust or without them we would be better off. I drew attention to the points that some social norms being influenced by late capitalism and on which our evaluation of increased productivity is based could be undesirable or unjust. This is why I ask for identifying, questioning, challenging and at the end trying to subvert or supplement these social norms if necessary, before deciding if we want to use such a claim about productivity in the debate around CE.

The work of this Ph.D. added empirical data about different population groups regarding the use of CE. No such data existed prior to starting this research and the data are still unique regarding questions about ethical aspects of such a use in Switzerland as well as the data about the facilities of request of physicians and their willingness to prescribe CE. Such data helps fostering the debate in the public sphere for which we wrote articles in journals that are easier to access by the general public than peer-reviewed journals. To expand the knowledge on moral actors in the field of CE, quantitative interviews with students and physician could be conducted to find out more about their personal attitudes concerning the use of CE as well as their view on ethical aspects about the use of CE.

As discussed in the introduction in 1.4, the function of empirical data does not just add knowledge to the field of normative ethics but is mandatory for understanding the ethical actors. Such a conclusion is deriving from the social epistemology favoured by many feminist but also other nonmainstream ethical approaches that we should turn away from the focus on rational, disembodied and impersonal individuals towards seeing morality as a collaborative social practice leading to relationships, responsibilities and commitments [48]. If the social, cultural and economic situation influences the moral judgements of individuals, than it is important that we systematically analyse in ethics what people really do in certain situation and what their reasons for their acts and choices are [47, p. 47]. Applied to us as researcher, this means that we ourselves are influenced by the experiences we made. Therefore, an ethical reflection is inescapably along a specific line of sight [47, p. 47]. It is easily possible that we as researcher miss certain important aspects about important principles, norms, virtues and values of a specific case in ethics because our own experiences gets somehow into our way. Only with the help of empirical ethics, the views of others can be integrated. Such integration is even more important because the people involved in ethical research are mostly part of a subgroup not at all represent the people of the world.

I am fairly convinced that such integration of other views is of high importance and will continue in the field of ethics. It is important to involve people who are in the

specific case discussed in ethics (e.g. organ donation, terminally ill and thinking about physician assisted suicide or being asked to donate embryos to stem cell research). This can be achieved with various methodologies in the field of empirical ethics. On the other hand, a higher diversity among researcher in the field of ethics is needed. How such a process took place in the past can be seen in the example of feminist movements. Firstly, women very similar to their background of the men who were involved in the decision processes of a society (mostly white, well-educated, non-disabled) fought successfully for being part of decision processes in a society. That does not mean that women with other backgrounds were not involved in such fights at all but that it took longer for them to be heard, by men but also by the group of white, well-educated women. In the field of ethics being aware that our experiences influence our opinions and views on ethical topics, it is of high importance that various views are heard. This can be reached by asking the people being in specific situation discussed in ethics but also by having more subgroups of people represented in the field of research in bioethics. This way, we can decrease certain bias in ethical discussions based on our specific experiences.

Appendices

A Questionnaires

B.1 Structure of Questionnaire among Students

B.2 Questionnaire among Students

B.3 Questionnaire among Physician

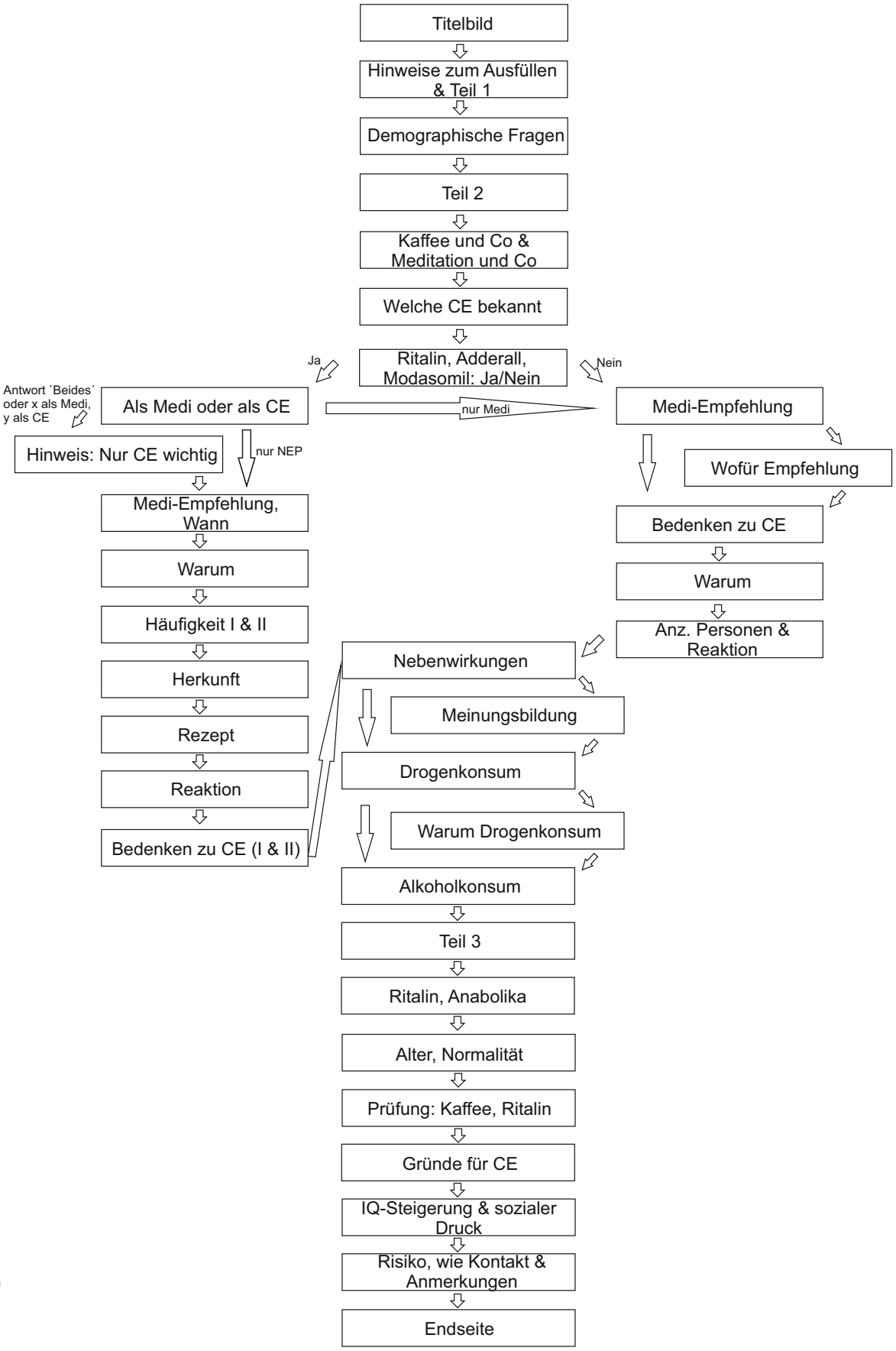


Figure A.1.: Structure of Questionnaire among Students.

3%

Universität Zürich[UZH]

Guten Tag

Das Ausfüllen des Fragebogens wird etwa 15 Minuten dauern.

Die Umfrage ist Teil meines Doktorats zum Gebrauch von leistungssteigernden Produkten.

regula.ott@uzh.ch

Weiter

5%

Die Umfrage ist anonym, das heisst die Daten können NICHT mit Ihnen in Verbindung gebracht werden!

Beispiel für eine Frage, wo nur eine Antwort ausgewählt werden sollte.
Steht vor den Antwortskategorien ein Kreis, dann ist es eine Einfachantwort, d.h. nur eine Antwort soll ausgewählt werden.

- ◯ Antwort 1
- ◯ Antwort 2
- ◯ Antwort 3

Beispiel für eine Frage, wo mehrere Antworten angekreuzt werden können.
Steht vor den Antwortskategorien jeweils ein Viereck, dann können Sie mehrere Antworten ankreuzen.

- ☐ Antwort 1
- ☐ Antwort 2
- ☐ Antwort 3

Zurück Weiter

8%

Bitte füllen Sie den Fragebogen in der angegebenen Reihenfolge aus!

Bei ein paar Fragen steht neben der Antwortskategorie: "wenn angekreuzt, bitte weiter zur Frage xy".
Wenn Sie diese Antwort ankreuzen, blättern Sie bitte weiter bis zur Frage xy.

Wenn Sie eine andere Antwort angeklickt haben, bei der keine Anweisungen stehen, fahren Sie bitte mit der nächsten Frage des Fragebogens weiter.
Danke!

Teil 1
Im ersten Teil folgen ein paar Fragen zu Ihrer Person.

Zurück Weiter

Frageblock 1

11%

Was ist Ihr Geschlecht?

◯ weiblich ◯ männlich

In welchem Jahr wurden Sie geboren?

An welcher Institution studieren Sie?

◯ Universität Zürich ◯ ETH Zürich

Was studieren Sie im Hauptfach an der Universität Zürich?

Anzahl Semester an der Uni (inkl. FS 11):

Zurück Weiter

13%

Frageblock 2

Was ist die höchste abgeschlossene Ausbildung Ihrer Mutter?

- ◯ Primarschule
- ◯ Sekundarschule
- ◯ Berufslehre
- ◯ Berufsmittelschule (BMS)
- ◯ Gymnasium
- ◯ Universität / ETH
- ◯ Andere:
- ◯ Unbekannt

Was ist die höchste abgeschlossene Ausbildung Ihres Vaters?

- ◯ Primarschule
- ◯ Sekundarschule
- ◯ Berufslehre
- ◯ Berufsmittelschule (BMS)
- ◯ Gymnasium
- ◯ Universität / ETH
- ◯ Andere:
- ◯ Unbekannt

Zurück Weiter

16%

Frageblock 3

Sind Sie aktiv im StuRa, im VAUZ, in Fachvereinen/Fachschaften, in Fakultätsversammlungen oder in Kommissionen der Uni Zürich?

◯ Kenn ich nicht ◯ Nein ◯ Ja

Sind Sie in einer Studentenverbindung?

◯ Kenn ich nicht ◯ Nein ◯ Ja

In welchem Bereich liegt Ihre ungefähre durchschnittliche Note aller bisher besuchten Module des Hauptfaches?

- ◯ 2.5-2.9
- ◯ 3.0-3.4
- ◯ 3.5-3.9
- ◯ 4.0-4.4
- ◯ 4.5-4.9
- ◯ 5.0-5.4
- ◯ 5.5-6.0
- ◯ Schwer zu sagen, da die Mehrzahl meiner Module des Hauptfaches mit einem "bestanden" / "nicht bestanden" benotet wurden.

Zurück Weiter

18%

Frageblock 4

Wo wohnen Sie?

- ◯ Bei meinen Eltern / einem Elternteil.
- ◯ In einer WG.
- ◯ In einem Studentenheim.
- ◯ Alleine in einer Wohnung.
- ◯ Als Paar in einer Wohnung, einem Haus.
- ◯ Als Paar mit Kindern in einer Wohnung, einem Haus.
- ◯ In: _____

Wenn am nächsten Sonntag Nationalratswahlen wären, welcher Partei würden Sie Ihre Stimme hauptsächlich geben? (Unabhängig davon, ob Sie stimmberechtigt sind oder nicht.)

- ◯ Christlichdemokratische Volkspartei (CVP)
- ◯ Grüne Partei (GPS)
- ◯ Schweizerische Volkspartei (SVP)
- ◯ Freisinnig-demokratische Partei (FDP)
- ◯ Sozialdemokratische Partei der Schweiz (SP)
- ◯ Grünliberale Partei (GLP)
- ◯ Andere
- ◯ Keine (zuwenig Überschneidung, Mangel an Kenntnissen oder politisch uninteressiert)

Zurück Weiter

Frageblock 5

21%

Welcher Konfession bez. Religion gehören Sie an?

- ◯ Evangelisch-reformierte Kirche
- ◯ Römisch-katholische Kirche
- ◯ Andere christliche Kirchen oder Gemeinschaften
- ◯ Jüdische Glaubensgemeinschaft
- ◯ Islamische Glaubensgemeinschaften
- ◯ Andere Kirchen und Religionsgemeinschaften
- ◯ Keine Zugehörigkeit

Wie wichtig ist für Sie im Alltag Ihre Religion?

◯ sehr wichtig ◯ wichtig ◯ eher nicht wichtig ◯ nicht wichtig

Zurück Weiter

Frageblock 6

24%

Wie viel Geld haben Sie derzeit insgesamt pro Monat zur Verfügung (Beiträge von den Eltern oder anderen Familienmitgliedern, eigener Verdienst, Stipendien und Darlehen, usw.)?

- ◯ 0-999 Fr.
- ◯ 1000-1999 Fr.
- ◯ 2000-2999 Fr.
- ◯ 3000-3999 Fr.
- ◯ 4000-4999 Fr.
- ◯ 5000 Fr. oder mehr
- ◯ keine Angaben

Das durchschnittliche monatliche Bruttohaushaltseinkommen betrug in der Schweiz im Jahr 2008 ~9150.- Fr. Wie verhält sich dazu das Bruttohaushaltseinkommen in Ihrem Elternhaus (Einkommen der Eltern oder eines Elternteiles aus Arbeit, Vermögenseinkommen, Sozialleistungen, Alimenten, Vermietung etc.)?

- ◯ Unterdurchschnittlich
- ◯ Durchschnittlich
- ◯ Überdurchschnittlich
- ◯ Weit überdurchschnittlich
- ◯ Diese Frage kann ich nicht sinnvoll beantworten.

Zurück Weiter

29%

TEIL 2

Die folgenden Fragen haben zum Ziel, Ihre Einstellung zu Produkten aufzuzeigen, mit denen die Konzentration oder die Wachheit gesteigert werden kann.

Zurück Weiter

Frageblock 7

32%

Welche, falls überhaupt, der folgenden Produkte konsumierten Sie in den letzten 12 Monaten zur Steigerung der Konzentration und/oder Wachheit? (Kästchen bedeuten immer, dass mehrere Antworten möglich sind)

- [ ] Traubenzucker (z.B. Dextro Energen)
- [ ] Khat
- [ ] Red Bull
- [ ] Coca Cola
- [ ] Kaffee
- [ ] Zigaretten
- [ ] Schwarztee
- [ ] Guarana (Als Pille, als Zusatz in Getränken oder Kaugummis, etc.)
- [ ] Ich konsumierte in den letzten 12 Monaten keines dieser Produkte zur Steigerung der Konzentration oder der Wachheit.

Was tun Sie zur Steigerung der Konzentration und/oder Wachheit beim Lernen oder Studieren? (mehrere Antworten möglich)

- [ ] Spaziergang
- [ ] Lernpausen
- [ ] Dehnen
- [ ] Sport
- [ ] Yoga
- [ ] Autogenes Training
- [ ] Anderes/weiteres:
- [ ] Keine besonderen Handlungen.

Zurück Weiter

Frage 8

34%

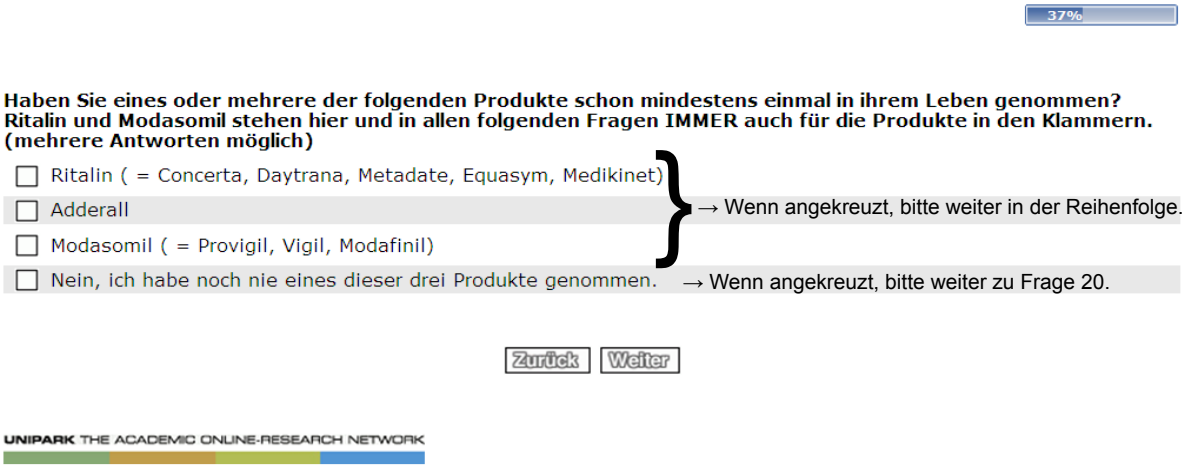
Von welchen der folgenden Produkten oder Produktengruppen wissen Sie, dass sie auch von gesunden Personen zur Steigerung der Konzentration oder der Wachheit eingenommen werden können? (mehrere Antworten möglich)

Bitte klicken Sie eine Gruppe an, wenn Sie von mindestens einem Produkt der Gruppe das oben Erwähnte wissen.

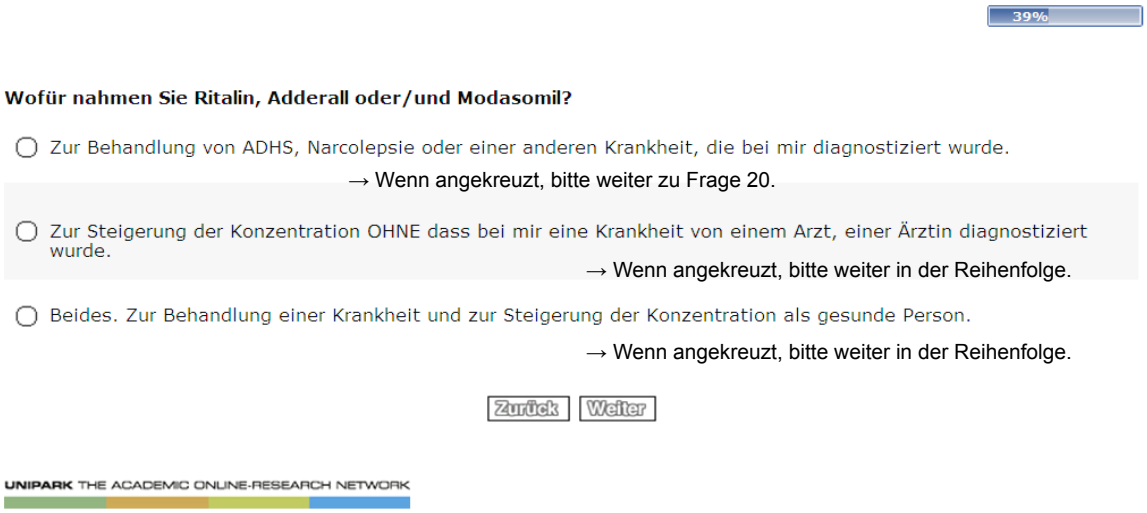
- [ ] Provigil, Vigil, Modafinil
- [ ] Modasomil
- [ ] Ritalin
- [ ] Adderall
- [ ] Concerta, Focalin, Equasym, Medikinet, Daytrana, Metadate
- [ ] Von keinem dieser Produkte.

Zurück Weiter

Frage 9



Frage 10



41%

In den folgenden Frage bitte ich Sie, bei Ihren Antworten NUR die Einnahme zur Steigerung der Konzentration oder der Wachheit zu berücksichtigen.

Also bitte NICHT die Einnahme zur Behandlung einer Krankheit berücksichtigen.

Danke!

Zurück Weiter

Frageblock 11

45%

Wurde Ihnen die Einnahme von Ritalin, Adderall und/oder Modasomil von jemandem empfohlen? (mehrere Antworten möglich)

- [ ] Ja, von jemandem aus meiner Familie.
- [ ] Ja, von Kollegen, Freunden oder Bekannten.
- [ ] Ja, von Mitstudierenden.
- [ ] Ja, von meinem Arzt / meiner Ärztin.
- [ ] Ja, von jemand anderem/weiterem, nämlich:
- [ ] Nein, von niemandem.

Wann nahmen Sie Ritalin, Adderall und/oder Modasomil? (mehrere Antworten möglich)

- [ ] In der Vorbereitungszeit für eine Prüfung.
- [ ] In einer Prüfung.
- [ ] In einer anderen/weiteren Situation, nämlich:
- [ ] In keiner bestimmten Situation.

Zurück Weiter

Frage 12

47%

Warum nahmen Sie Ritalin, Adderall und/oder Modasomil? (mehrere Antworten möglich)

- ☐ Zur Verminderung von Jetlag.
- ☐ Um bessere Noten zu kriegen.
- ☐ Weil ich zuwenig Zeit hatte.
- ☐ Aus Neugier wie es wirkt.
- ☐ Um konzentrierter zu sein.
- ☐ Da es andere auch taten.
- ☐ Weil ich gestresst war.
- ☐ Um in Stimmung zu kommen, z.B. im Ausgang.
- ☐ Um wacher zu sein.
- ☐ Für einen anderen/weiteren Zweck, nämlich: _____

Zurück Weiter

Frage 13

50%

Wie oft in Ihrem Leben haben Sie Ritalin, Adderall und/oder Modasomil NUR zur Steigerung der Konzentration oder der Wachheit genommen?

	Ritalin	Adderall	Modasomil
Noch nie.	○	○	○
Einmal in meinem Leben.	○	○	○
Zwei bis fünfmal in meinem Leben.	○	○	○
Mehr als fünfmal in meinem Leben.	○	○	○

Zurück Weiter

Frageblock 14

53%

Wann haben Sie Ritalin genommen? Bitte berücksichtigen Sie auch hier NICHT einen allfälligen Gebrauch zur Behandlung einer Krankheit wie z.B. ADHS.

- ◯ NICHT in den letzten 12 Monaten genommen.
- ◯ NICHT in den letzten 30 Tagen genommen.
- ◯ In den letzten 30 Tagen genommen.

Wann haben Sie Adderall genommen? Bitte berücksichtigen Sie auch hier NICHT einen allfälligen Gebrauch zur Behandlung einer Krankheit wie z.B. ADHS.

- ◯ NICHT in den letzten 12 Monaten genommen.
- ◯ NICHT in den letzten 30 Tagen genommen.
- ◯ In den letzten 30 Tagen genommen.

Wann haben Sie Modasomil genommen? Bitte berücksichtigen Sie auch hier NICHT einen allfälligen Gebrauch zur Behandlung einer Krankheit wie z.B. Narkolepsie.

- ◯ NICHT in den letzten 12 Monaten genommen.
- ◯ NICHT in den letzten 30 Tagen genommen.
- ◯ In den letzten 30 Tagen genommen.

Zurück Weiter

Frage 15

Bitte nur für die Produkte ankreuzen, die schon mindestens einmal zur Steigerung der Konzentration oder der Wachheit genommen haben.

55%

Woher bezogen Sie Ritalin? Falls Sie mehrere Bezüge vornahmen, klicken Sie bitte alle bisherigen Bezugsquellen an. (mehrere Antworten möglich)

- ☐ Von einem Arzt / einer Ärztin.
- ☐ Übers Internet.
- ☐ Von jemandem meiner Familie.
- ☐ Von Kollegen/Kolleginnen, Freunden oder Bekannten.
- ☐ In einer Apotheke.
- ☐ Über einen anderen/weiteren Weg, nämlich:

Woher bezogen Sie Adderall? Falls Sie mehrere Bezüge vornahmen, klicken Sie bitte alle bisherigen Bezugsquellen an. (mehrere Antworten möglich)

- ☐ Übers Internet.
- ☐ Von Kollegen/Kolleginnen, Freunden oder Bekannten.
- ☐ In einer Apotheke.
- ☐ Von jemandem meiner Familie.
- ☐ Von einem Arzt / einer Ärztin.
- ☐ Über einen anderen/weiteren Weg, nämlich:

Woher bezogen Sie Modasomil? Falls Sie mehrere Bezüge vornahmen, klicken Sie bitte alle bisherigen Bezugsquellen an. (mehrere Antworten möglich)

- ☐ Von einem Arzt / einer Ärztin.
- ☐ Von jemandem meiner Familie.
- ☐ Von Kollegen/Kolleginnen, Freunden oder Bekannten.
- ☐ Übers Internet.
- ☐ In einer Apotheke.
- ☐ Über einen anderen/weiteren Weg, nämlich:

Zurück Weiter

Frage 16

Bitte nur für die Produkte ankreuzen, die schon mindestens einmal zur Steigerung der Konzentration oder der Wachheit genommen haben.

58%

Benötigten Sie für den Bezug von Ritalin ein Rezept? Falls ja, woher hatten Sie dieses? Falls Sie mehrere Bezüge vornahmen, klicken Sie bitte alle schon erlebten Fälle an. (mehrere Antworten möglich)

- ☐ Nein ich benötigte kein Rezept.
- ☐ Ja ich benötigte ein Rezept. Ich bekam dies von einem Arzt / einer Ärztin.
- ☐ Ja ich benötigte ein Rezept. Ich stellte dies selber aus.
- ☐ Ja ich benötigte ein Rezept. Ich bekam dies von jemand anderem/weiterem:

Benötigten Sie für den Bezug von Adderall ein Rezept? Falls ja, woher hatten Sie dieses? Falls Sie mehrere Bezüge vornahmen, klicken Sie bitte alle schon erlebten Fälle an. (mehrere Antworten möglich)

- ☐ Nein ich benötigte kein Rezept.
- ☐ Ja ich benötigte ein Rezept. Ich bekam dies von einem Arzt / einer Ärztin.
- ☐ Ja ich benötigte ein Rezept. Ich stellte dies selber aus.
- ☐ Ja ich benötigte ein Rezept. Ich bekam dies von jemand anderem/weiterem:

Benötigten Sie für den Bezug von Modasomil ein Rezept? Falls ja, woher hatten Sie dieses? Falls Sie mehrere Bezüge vornahmen, klicken Sie bitte alle schon erlebten Fälle an. (mehrere Antworten möglich)

- ☐ Nein ich benötigte kein Rezept.
- ☐ Ja ich benötigte ein Rezept. Ich bekam dies von einem Arzt / einer Ärztin.
- ☐ Ja ich benötigte ein Rezept. Ich stellte dies selber aus.
- ☐ Ja ich benötigte ein Rezept. Ich bekam dies von jemand anderem/weiterem:

Zurück Weiter

Frage 17

61%

Haben Sie mindestens jemandem von Ihrem Konsum von Ritalin, Adderall und/oder Modasomil erzählt? Wenn ja, wie waren die Reaktionen insgesamt? (mehrere Antworten möglich)

- ☐ Ja, ich habe es erzählt und die Reaktion war zustimmend gegenüber meiner Handlung.
- ☐ Ja, ich habe es erzählt und die Reaktion war neutral gegenüber meiner Handlung.
- ☐ Ja, ich habe es erzählt und die Reaktion war ablehnend gegenüber meiner Handlung.
- ☐ Ja, ich habe es erzählt und die Reaktionen waren sehr unterschiedlich.
- ☐ Nein, ich habe es niemandem erzählt.

Zurück Weiter

Frage 18

63%

Welchen der folgenden Bedenken bezüglich einer ÜBERMÄSSIGEN Einnahme von Ritalin, Adderall und Modasomil nur zur Steigerung der Konzentration oder der Wachheit stimmen Sie zu?

	Stimme zu	Stimme nicht zu	Weiss nicht
Ich würde dadurch die Menschen betrügen, die solche Produkte nicht einsetzen.	◯	◯	◯
Die Gefahr, süchtig zu werden.	◯	◯	◯
Gott hat die Menschen nach seinem Plan erschaffen. Darum sollten wir nicht versuchen, uns mit solchen Produkten zu verbessern.	◯	◯	◯
Das Ziel dieser Produkte ist es, dass man noch mehr leisten kann. Diesen Leistungswahn finde ich bedenklich.	◯	◯	◯
Meine innere Stimme sagt mir, dass wir besser die Finger von solchen Produkten lassen sollen.	◯	◯	◯
Ich könnte nicht mehr stolz auf meine Leistung sein.	◯	◯	◯
Wenn das viele Menschen tun würden, hätte das schlechte Auswirkungen auf die Gesellschaft als Ganzes.	◯	◯	◯
Diese Produkte stellen einen unnatürlichen Eingriff in unseren Körper dar.	◯	◯	◯
Die Sorge vor möglichen Nebenwirkungen.	◯	◯	◯
Dass ich mich dadurch verändern würde und nicht mehr ich selber wäre.	◯	◯	◯

Zurück Weiter

Frage 19

66%

Ab wann ungefähr würden Sie einen Konsum als übermässig bezeichnen?

- ◯ Bei mehreren Einnahmen pro Tag.
- ◯ Bei einer Einnahme pro Tag.
- ◯ Bei einer Einnahme pro Woche.
- ◯ Bei einer Einnahme pro 2 Wochen.
- ◯ Bei einer Einnahme pro Monat.
- ◯ Bei einer Einnahme pro 6 Monaten.
- ◯ Kann ich nicht sagen.

} → Bitte weiter zu Frage 25.

Zurück Weiter

Frage 20

42%

Wurde Ihnen die Einnahme von Ritalin, Adderall und/oder Modasomil schon mindestens einmal empfohlen? Berücksichtigen Sie bitte KEINE Empfehlungen zur Behandlung einer Krankheit. Wenn ja, von wem? (mehrere Antworten möglich)

- ☐ Ja, von Mitstudierenden.
- ☐ Ja, von meinem Arzt / meiner Ärztin.
- ☐ Ja, von Kollegen, Freunden oder Bekannten.
- ☐ Ja, von jemandem aus meiner Familie.
- ☐ Ja, von jemand anderem/weiterem, nämlich: _____
- ☐ Nein, noch nie. → Bitte weiter zu Frage 22.

Zurück Weiter

UNIPARK THE ACADEMIC ONLINE-RESEARCH NETWORK

Frage 21

47%

Warum bzw. wofür wurde Ihnen Ritalin, Adderall und/oder Modasomil empfohlen? (mehrere Antworten möglich)

- ☐ Um konzentrierter zu sein.
- ☐ Um wacher zu sein.
- ☐ Um in Stimmung zu kommen, z.B. im Ausgang.
- ☐ Um bessere Noten zu kriegen.
- ☐ Weil ich zuwenig Zeit hatte.
- ☐ Weil ich gestresst war.
- ☐ Zur Verminderung von Jetlag.
- ☐ Da es andere auch tun.
- ☐ Für einen anderen/weiteren Zweck, nämlich: _____

Zurück Weiter

UNIPARK THE ACADEMIC ONLINE-RESEARCH NETWORK

Frage 22

53%

Welchen der folgenden Bedenken bezüglich der Einnahme von Ritalin, Adderall und Modasomil nur zur Steigerung der Konzentration oder der Wachheit stimmen Sie zu?

	Stimme zu	Stimme nicht zu	Weiss nicht
Gott hat die Menschen nach seinem Plan erschaffen. Darum sollten wir nicht versuchen, uns mit solchen Produkten zu verbessern.	○	○	○
Die Gefahr, süchtig zu werden.	○	○	○
Meine innere Stimme sagt mir, dass wir besser die Finger von solchen Produkten lassen sollen.	○	○	○
Die Sorge vor möglichen Nebenwirkungen.	○	○	○
Ich könnte nicht mehr stolz auf meine Leistung sein.	○	○	○
Ich würde dadurch die Menschen betrügen, die solche Produkte nicht einsetzen.	○	○	○
Wenn das viele Menschen tun würden, hätte das schlechte Auswirkungen auf die Gesellschaft als Ganzes.	○	○	○
Das Ziel dieser Produkte ist es, dass man noch mehr leisten kann. Diesen Leistungswahn finde ich bedenklich.	○	○	○
Diese Produkte stellen einen unnatürlichen Eingriff in unseren Körper dar.	○	○	○
Dass ich mich dadurch verändern würde und nicht mehr ich selber wäre.	○	○	○

Zurück Weiter

Frage 23

58%

Können Sie sich vorstellen, unter den folgenden Umständen Ritalin, Adderall oder Modasomil zu nehmen? Bitte berücksichtigen Sie NICHT die Einnahme des Produktes gegen eine Krankheit. (mehrere Antworten möglich)

- ☐ Ja, wenn es andere auch tun.
- ☐ Ja, um wacher zu sein.
- ☐ Ja, um bessere Noten zu kriegen.
- ☐ Ja, um in Stimmung zu kommen, z.B. im Ausgang.
- ☐ Ja, da ich neugierig bin wie es wirken würde.
- ☐ Ja, falls ich gestresst bin.
- ☐ Ja, falls ich zuwenig Zeit habe.
- ☐ Ja, um konzentrierter zu sein.
- ☐ Ja, zur Verminderung von Jetlag.
- ☐ Ja, für einen anderen/weiteren Zweck, nämlich: _____
- ☐ Nein, eher nicht.
- ☐ Nein, niemals.

Zurück Weiter

Frageblock 24

63%

Bitte berücksichtigen Sie in den Fragen auf dieser Seite nur Personen, die Ritalin, Adderall oder Modasomil ausschliesslich zur Steigerung der Konzentration oder der Wachheit genommen haben! Das heisst, bitte KEINE Personen berücksichtigen, die diese Produkte zur Behandlung einer Krankheit genommen haben.

Von wie vielen Personen haben Sie schon gehört, dass sie Ritalin, Adderall oder Modasomil schon mindestens einmal in den letzten 12 Monaten genommen haben?

0	1-3	4-6	7-9	10 und mehr
○	○	○	○	○

Wie viele Personen erzählten Ihnen persönlich, dass sie Ritalin, Adderall oder Modasomil mindestens einmal in den letzten 12 Monaten genommen haben?

0	1-3	4-6	7-9	10 und mehr
○	○	○	○	○

Finden Sie es richtig, wenn jemand Ritalin, Adderall oder Modasomil nimmt ohne dass eine Krankheit diagnostiziert wurde, gegen die Ritalin, Adderall oder Modasomil verschrieben wird?

- ○ Ja, ich finde es gut.
- ○ Nein, ich finde es nicht gut.
- ○ Bin noch unentschlossen.
- ○ Ist mir egal.

Zurück Weiter

UNIPARK THE ACADEMIC ONLINE-RESEARCH NETWORK

Frage 25

68%

Wie schätzen Sie die Nebenwirkungen von Ritalin, Adderall oder Modasomil ein?

	Nicht bedenklich	eher nicht bedenklich	eher bedenklich	sehr bedenklich	Schwer zu sagen, da man noch zuwenig darüber weiss.	Kenne Produkt zu wenig.
Ritalin	○	○	○	○	○	○
Adderall	○	○	○	○	○	○
Modasomil	○	○	○	○	○	○

Zurück Weiter

UNIPARK THE ACADEMIC ONLINE-RESEARCH NETWORK

→ Wenn Sie bei allen drei Produkten nur diese zwei Antworten angeklickt haben, dann bitte weiter zu Frage 27.

Frage 26

71%

Wie entstand ihre Meinung zur Einschätzung der Nebenwirkungen? (mehrere Antworten möglich)

- [ ] Im Gespräch mit Freunden und Bekannten, die es nicht nehmen.
- [ ] Im Gespräch mit Fachpersonen (ÄrztInnen, ApothekerInnen, Pflegepersonal).
- [ ] Durch das Lesen von Fachliteratur.
- [ ] Durch die Darstellung dieser Produkte in den Medien (Printmedien, Fernseh, Internet).
- [ ] Im Gespräch mit Freunden und Bekannten, die es nehmen.
- [ ] Durch etwas anderes/weiteres, nämlich: _____
- [ ] Durch nichts Konkretes, eher mein Bauchgefühl.

Zurück Weiter

Frage 27

74%

Haben Sie eine oder mehrere der folgenden Substanzen mindestens einmal in Ihrem Leben konsumiert? (mehrere Antworten möglich)

- [ ] Amphetamine (z.B. Speed)
- [ ] Ecstasy (= MDMA)
- [ ] Heroin
- [ ] Cannabis
- [ ] Crack
- [ ] halluzinogene Pilze
- [ ] Kokain
- [ ] Thai-Pillen
- [ ] LSD
- [ ] Andere/weitere Substanzen, nämlich: _____
- [ ] Nein, ich habe noch nie eine dieser Substanzen konsumiert. → Bitte weiter zu Frage 29.

Zurück Weiter

Frage 28

76%

Warum nahmen Sie eine oder mehrere der in der letzten Frage aufgelisteten Substanzen? (mehrere Antworten möglich)

- [ ] Aus Neugier, wie es sich anfühlt.
- [ ] Um meine Leistung zu steigern.
- [ ] Da es andere auch tun.
- [ ] Um wacher zu sein.
- [ ] Da ich den Zustand oder das Gefühl, das die Droge auslöst, geniesse.
- [ ] Um meine Stimmung zu verbessern, z.B. im Ausgang.
- [ ] Um konzentrierter zu sein.
- [ ] Für einen anderen/weiteren Zweck, nämlich:
- [ ] Zur Behandlung einer Krankheit.

Zurück Weiter

Frage 29

78%

Wie häufig trinken Sie im Allgemeinen alkoholische Getränke (Bier, Wein, Champagner oder hochprozentigen Alkohol)?

- ◯ 3 mal oder mehr pro Tag.
- ◯ 1-2 mal pro Tag (z.B. jeweils zu den Mahlzeiten).
- ◯ 3 mal oder mehr als dreimal pro Woche.
- ◯ 1-2 mal pro Woche.
- ◯ 1-3 mal pro Monat.
- ◯ Seltener als monatlich.
- ◯ Nie, abstinent.

Zurück Weiter

82%

TEIL 3

Im dritten und letzten Teil folgen noch ein paar Fragen zu Ihren persönlichen Einstellungen.

Zurück Weiter

Frage 30

84%

Stellen Sie sich bitte eine gesunde 25-jährige Person vor. Sie sind mit dieser Person befreundet und studieren zusammen. Wie reagieren Sie, wenn Ihnen diese Person erzählt, dass sie...

	Das finde ich in Ordnung.	Das finde ich NICHT in Ordnung.	Neutral, das ist ihre Angelegenheit.	Weiss nicht wie ich reagieren würde.
...Ritalin nimmt zur Steigerung der Konzentration.	○	○	○	○
...Anabolika nimmt zur Steigerung des Muskelaufbaues.	○	○	○	○

Anmerkungen zu Ihrer Antwort:

.....
.....
.....
.....
.....

Zurück Weiter

Frage 31

86%

Stellen Sie sich bitte eine gesunde 65-jährige Person vor, die ein Produkt nimmt um dem normalen, altersbedingten geistigen Abbau entgegen zu wirken. Was halten Sie davon?

- ◯ Das finde ich in Ordnung.
- ◯ Das finde ich NICHT in Ordnung.
- ◯ Neutral, das ist ihre Angelegenheit.
- ◯ Weiss nicht wie ich reagieren würde.

Finden Sie die Einnahme durch eine gesunde, 65-jährige Person aus oben genannten Gründen das Gleiche, wie wenn eine gesunde 25-jährige Person das gleiche Produkt zur Steigerung der Konzentration nimmt?

◯ Ja ◯ Nein ◯ Unentschieden

Anmerkungen zu Ihrer Antwort:

.....
.....
.....
.....
.....

Glauben Sie, dass es in 10 Jahren normal sein wird, Produkte wie Ritalin, Adderall oder Modasomil zur Leistungssteigerung einzunehmen?

◯ Ja ◯ Nein ◯ Unentschieden

Zurück Weiter

Frage 32

89%

Finden Sie es akzeptabel, wenn jemand Kaffee vor einer Prüfung trinkt um seine Wachheit und/oder Konzentration zu steigern?

◯ Ja ◯ Nein ◯ Unentschieden

Finden Sie es akzeptabel, wenn jemand Ritalin vor einer Prüfung einnimmt um seine Wachheit und/oder Konzentration zu steigern?

◯ Ja ◯ Nein ◯ Unentschieden

Zurück Weiter

Frage 33

92%

Was sind/wären für Sie Gründe, Ritalin, Adderall oder Modasomil zu nehmen?

Bitte bewerten Sie jede Aussage einzeln und UNABHÄNGIG davon, wie Sie gesamthaft zur Einnahme dieser Produkte stehen!

	Ich stimme zu	Ich stimme nicht zu	Un-entschieden
"Ich könnte dadurch eine bessere Leistung erbringen und im Leben schneller vorankommen. Somit kann ich mehr verdienen und ein angenehmeres Leben führen."	○	○	○
"Ich könnte dadurch viele Arbeiten rascher erledigen. So hätte ich mehr Freizeit und weniger Stress."	○	○	○
"Diese Produkte wären eine Art Vorbeugung. Wenn ich dank ihnen fitter werden würde im Kopf, dann würde ich im Alter auch weniger unter Vergesslichkeit und Ähnlichem leiden."	○	○	○
"Ich könnte dadurch meine geistige Frische zurückgewinnen. Denn manchmal fühle ich mich geistig nicht mehr ganz so fit wie früher."	○	○	○
"Ich könnte dank diesen Produkten schneller lernen. Und vielleicht würde ich Sachen begreifen, die ich früher nicht verstanden habe."	○	○	○
"Ich könnte mir dadurch mehr Anerkennung und Respekt verschaffen, da ich mit diesen Produkten eine bessere Leistung erbringen könnte."	○	○	○

Zurück Weiter

Frage 34

95%

Würden Sie ein Produkt, das Ihren IQ für eine begrenzte Zeit steigern würde und ohne jegliche Nebenwirkungen wäre, einnehmen?

- ○ Ja, einmal zum ausprobieren.
- ○ Ja und vermutlich mehr als einmal.
- ○ Nein, ich würde dieses Produkt nicht einnehmen.
- ○ Unentschieden.

Was denken Sie, wie würden Ihre Eltern reagieren, wenn Sie ihnen mitteilen würden, dass Sie Ihr Studium abbrechen und dafür eine Lehre beginnen würden, für die Sie bereits eine Lehrstelle hätten? (mehrere Antworten möglich)

- ☐ Sie wären überrascht.
- ☐ Sie wären enttäuscht.
- ☐ Hauptsache ich finde meinen Weg.
- ☐ Würden es akzeptieren.
- ☐ Dass ich studiere ist Ihnen sehr wichtig.
- ☐ Würden sich freuen.
- ☐ Sie würden es nicht akzeptieren.
- ☐ Wäre Ihnen egal.
- ☐ Keine Ahnung, wie sie reagieren würden.

Zurück Weiter

Frage 35

97%

Wie schätzen Sie sich persönlich ein: Sind Sie im Allgemeinen ein risikobereiter Mensch oder versuchen Sie, Risiken zu vermeiden?
Auf der 10stufigen Skala bedeutet ein Kreuz ganz links "gar nicht risikobereit" und ganz rechts "sehr risikobereit". Dazwischen gibt es Abstufungen.

Gar nicht risikobereit ○ ○ ○ ○ ○ ○ ○ ○ ○ ○ Sehr risikobereit

Wussten Sie bereits vor der heutigen Vorlesung von dieser Umfrage? Wenn ja, woher? (mehrere Antworten möglich)

- ☐ Ja, ich bekam eine E-Mail von der UZH (Rechtsdienst).
- ☐ Ja, ich bekam eine E-Mail vom Fachverein oder via einer Fach-Mailingliste.
- ☐ Ja, ich bekam einen Flyer.
- ☐ Ja, ein Dozent, eine Dozentin erwähnte die Umfrage.
- ☐ Ja, ich bekam eine persönliche E-Mail.
- ☐ Ja, via:
- ☐ Nein, ich wusste bis heute nichts von dieser Umfrage.

Haben Sie diese Umfrage bereits früher ausgefüllt?

○ Nein ○ Ja ○ Möglich, bin mir nicht sicher

Anmerkungen zum Fragebogen:

.....
.....
.....
.....
.....

100%

Herzlichen Dank fürs Ausfüllen des Fragebogens!

Bei Fragen oder wenn Sie die ausgewerteten Daten der Umfrage zugeschickt bekommen möchten, können Sie mir gerne eine E-Mail an regula.ott@uzh.ch senden.

Universität Zürich[UZH]

Institut für Biomedizinische Ethik

Die Bedeutung des Neuroenhancements für praktizierende ÄrztInnen im Bereich Psychiatrie und Hausarztmedizin

❑❑	❑❑	❑❑
Die zwei Anfangsbuchstaben Ihres Vornamens	Tag Ihres Geburtsdatums	Die zwei Anfangsbuchstaben Ihres Nachnamens

Für das Ausfüllen des Fragebogens möchten wir uns bei Ihnen nochmals ganz herzlich bedanken! Ihre Anonymität bleibt in jedem Fall gewährleistet.

Anmerkungen zum Ausfüllen:

- Nehmen Sie sich genügend Zeit für das Lesen der Fragen.
- Machen Sie ein Kreuz in das Feld, das am besten als Antwort passt.
- Wenn Sie eine Antwort unmittelbar korrigieren möchten, streichen Sie den Fehler zweimal durch und machen Sie ein neues Kreuz. Bsp. ☒ ☒
- Wir bitten Sie, beim Ausfüllen des Fragebogens die vorgegebene Reihenfolge einzuhalten.

Universität Zürich[UZH]

Allgemeiner Teil

1 Demographische Angaben

a. Geburtsjahr (JJJJ): .....

b. Geschlecht

1❒ männlich

2❒ weiblich

c. FMH-Titel

1❒ Psychiatrie und Psychotherapie

2❒ Allgemeinmedizin

3❒ Innere Medizin

4❒ Anderer bzw. zusätzlicher FMH Titel:

.....

5❒ Keinen FMH Titel

d. Wie verteilen sich Ihre Patienten auf die vorgegebenen Alterskategorien? (geschätzte Angaben)

1 18-30 Jahre: .....%

2 31-43 Jahre: .....%

3 44-56 Jahre: .....%

4 57-69 Jahre: .....%

5 >69 Jahre: .....%

e. Wie lange sind Sie bereits als niedergelassene Ärztin / niedergelassener Arzt tätig?

Anzahl Jahre: .....

f. Umfeld der Praxis

1❒ eher ländlich

2❒ eher städtisch

Falls FMH-Titel Psychiatrie und Psychotherapie:

g. In welcher Therapierichtung wurden Sie ursprünglich ausgebildet?

.....

h. Patientengut (geschätzte Angaben in %)

1 Integrierte psychiatrisch-psychotherapeutische Behandlung (IPPB) .....%

2 Psychotherapie im engeren Sinne .....%

2 Begriff Neuroenhancement (NE)

2.1 Ist Ihnen der Begriff Neuroenhancement (NE) bekannt?

$_1$❒ Ja $_2$❒ Nein (Bitte weiter zu Frage 3)

2.2 Wenn ja, woher?

a.	Aus den Medien	$_1$❒ Ja	$_2$❒ Nein
b.	Aus der Fachliteratur	$_1$❒ Ja	$_2$❒ Nein
c.	Aus Gesprächen und Diskussionen im beruflichen Umfeld	$_1$❒ Ja	$_2$❒ Nein
d.	Aus Gesprächen und Diskussionen im privaten Umfeld	$_1$❒ Ja	$_2$❒ Nein

3 Ist Ihnen der Begriff Hirndoping schon begegnet?

$_1$❒ Ja $_2$❒ Nein

4 Welche spontanen Reaktionen zu der folgenden Aussage sind Ihnen am nächsten? (Mehrfachantworten möglich)

In den Medien finden sich immer wieder Meldungen, dass Studenten / Studentinnen und Arbeitstätige insbesondere in höheren Positionen zu Medikamenten greifen, um die eigene Leistung zu steigern:

a.	Kein Wunder, dass das so läuft, wenn die Anforderungen und der Konkurrenzdruck stetig zunehmen.	$_1$❒ Ja	$_2$❒ Nein	$_0$❒ Unentschieden
b.	Dem sollte man einen Riegel vorschieben können.	$_1$❒ Ja	$_2$❒ Nein	$_0$❒ Unentschieden
c.	Jeder ist selbst verantwortlich dafür, wie er mit sich umgeht.	$_1$❒ Ja	$_2$❒ Nein	$_0$❒ Unentschieden
d.	Die Menschen haben immer schon versucht, ihre Leistungs-möglichkeiten zu verbessern, Kaffee und Red Bull gibt es ja schon, heute stehen halt mehr Möglichkeiten zu Verfügung.	$_1$❒ Ja	$_2$❒ Nein	$_0$❒ Unentschieden
e.	Das ist ebenso falsch wie Doping im Sport.	$_1$❒ Ja	$_2$❒ Nein	$_0$❒ Unentschieden

Krankheitswert

5 Wenn Sie bestimmen müssen, ob eine Störung mit Krankheitswert vorliegt oder nicht, welche der folgenden Kriterien sind für Sie dafür ausschlaggebend (Mehrfachantworten möglich):

		Ja	Nein	Manchmal
a.	Der subjektive Leidensdruck	❒1	❒2	❒3
b.	Die Zuordbarkeit gemäss einem anerkannten Klassifikationssystem (Bspw. ICD oder DSM)	❒1	❒2	❒3
c.	Insbesondere in der somatischen Medizin die Objektivierbarkeit mittels labormedizinischer bzw. bildgebender Verfahren	❒1	❒2	❒3
d.	Negative Auswirkungen auf alltägliche Arbeitsfähigkeit	❒1	❒2	❒3

6 Es hat sich gezeigt, dass Ärzte / Ärztinnen verschieden damit umgehen, wenn ein Patient nach Medikamenten fragt, für welche keine Indikation gestellt werden kann.

Bitte geben Sie an, welche Aussage Ihnen persönlich am meisten entspricht (nur eine Antwort ankreuzen):

Wenn ich keine Indikation stellen kann, verschreibe ich auch nichts.	a❒
Grundsätzlich verschreibe ich nichts ohne Indikation. Ist der Leidensdruck aber gross und besteht beim Patienten der Wunsch nichts unversucht zu lassen, so kann es sein, dass ich auch etwas ohne klare Indikation verschreibe. Dies hängt jedoch von der Substanz, Kontraindikationen und unerwünschten Wirkungen ab.	b❒
Ich kläre den Patienten über allfällige Risiken des gewünschten Präparates auf und wenn er es dann immer noch möchte, so soll er es halt mal ausprobieren.	c❒

7 Welche der folgenden Präparate würden Sie auf Wunsch des Patienten und ohne klare Indikation verschreiben?

		Ja	Nein	Vielleicht
a.	NSAR	1❒	2❒	3❒
b.	Benzodiazepine	1❒	2❒	3❒
c.	Antibiotika	1❒	2❒	3❒
d.	Opioide	1❒	2❒	3❒
e.	Neuroleptika	1❒	2❒	3❒
f.	Laxantien	1❒	2❒	3❒
g.	Phosphodiesterase Typ 5 -Inhibitoren (Bspw. Sildenafil (Viagra®) u.ä)	1❒	2❒	3❒
h.	Antidepressiva	1❒	2❒	3❒
i.	Methylphenidat (Ritalin®)	1❒	2❒	3❒
j.	Modafinil (Modasomil®)	1❒	2❒	3❒
k.	Antidementiva	1❒	2❒	3❒

Neuroenhancement

Unter Neuroenhancement versteht man die Verbesserung, „Optimierung" kognitiver und emotionaler Fähigkeiten mittels medikamentöser Substanzen beim gesunden Menschen. Diesbezüglich werden hauptsächlich folgende Substanzen diskutiert, wenn auch mit unterschiedlicher klinischer Wirksamkeit:

- Methylphenidat (Ritalin®)
- Modafinil (Modasomil®)
- Antidepressiva
- Antidementiva

Zusätzlich einige weitere Substanzen, die sich jedoch auch als mögliche Therapeutika bei Krankheiten noch in der Experimentalphase befinden.

Nachfragen nach NE können in der Praxis in verschiedenen Kontexten stehen und von unterschiedlichem Leidensdruck begleitet sein. Im Folgenden soll dies anhand einiger Beispiele dargestellt werden.

Fallbeispiele

8 Ein Student steht vor den letzten und entscheidenden beiden Prüfungen. Besteht er sie, hat er seinen Abschluss und wird einen gut bezahlten Arbeitsplatz antreten können. Fällt er durch, wird er für das Studium nicht mehr zugelassen. Er hat vorgängig bereits Prüfungen wiederholen müssen, da er durch eine sehr schwierige Lebenssituation seiner Schwester selbst auch sehr belastet war und wenig Zeit und Kraft für das Studium gehabt hat. Nun, nach einer Zeit intensiver Prüfungsvorbereitungen, bittet er seinen Arzt für den „Schlussspurt" um ein Medikament, welches sein Schlafbedürfnis etwas reduziert um die verbleibende Zeit noch möglichst gut nutzen zu können.

8.1 Was würden Sie in der geschilderten Situation tun?

a.	Ich würde in solchen Situationen nur dann Medikamente verschreiben, wenn psychotherapeutische Verfahren oder Ähnliches nicht (genügend) helfen.	$_1$❐ Ja $_2$❐ Nein
b.	Ich würde ein Medikament wie Ritalin, Modasomil, Antidepressiva oder Antidementiva verschreiben.	$_1$❐ Ja $_2$❐ Nein
c.	Ich verschreibe in solchen Situationen grundsätzlich keine Medikamente.	$_1$❐ Ja $_2$❐ Nein
d.	Ich verschreibe in solchen Situationen keine Medikamente, verweise aber auf die Möglichkeit andere Kollegen aufzusuchen oder im Internet zu bestellen.	$_1$❐ Ja $_2$❐ Nein

8.2 Wenn Sie in der letzten Frage Medikamente verschrieben hätten: Welche der folgenden Substanzen würden Sie in der geschilderten Situation verschreiben?

Sonst bitte weiter zu 8.3.

a.	Methylphenidat (Ritalin®)	$_1$❐ Ja	$_0$❐ Vielleicht	$_2$❐ Nein
b.	Modafinil (Modasomil®)	$_1$❐ Ja	$_0$❐ Vielleicht	$_2$❐ Nein
c.	Antidepressiva	$_1$❐ Ja	$_0$❐ Vielleicht	$_2$❐ Nein
d.	Antidementiva	$_1$❐ Ja	$_0$❐ Vielleicht	$_2$❐ Nein
e.	Betablocker	$_1$❐ Ja	$_0$❐ Vielleicht	$_2$❐ Nein

8.3 Kennen Sie entsprechende Anfragen aus Ihrer Praxis?

$_1$❒ Ja $_2$❒ Nein (->bitte weiter zu Beispiel 9)

8.3.1 Wie häufig sind Sie mit vergleichbaren Anfragen konfrontiert?

❒$_1$	❒$_2$	❒$_3$	❒$_4$	❒$_5$	❒$_6$
äusserst selten	1-2 mal jährlich	4-6 mal jährlich	monatlich	wöchentlich	täglich

8.3.2 Haben Sie in einer solchen Situation / in solchen Situationen eines oder mehrere der folgenden Medikamente verschrieben?

a.	Methylphenidat (Ritalin®)	$_1$❒ Ja	$_2$❒ Nein
b.	Modafinil (Modasomil®)	$_1$❒ Ja	$_2$❒ Nein
c.	Antidepressiva	$_1$❒ Ja	$_2$❒ Nein
d.	Antidementiva	$_1$❒ Ja	$_2$❒ Nein
e.	Betablocker	$_1$❒ Ja	$_2$❒ Nein

9 Eine allein erziehende Frau von zwei schulpflichtigen Kindern pflegt seit ein paar Wochen auch ihre terminal erkrankte Mutter zu Hause und ist mittlerweile ziemlich müde. Doch möchte Sie die Pflege unbedingt selbst weiterführen können und ihre Mutter nicht in eine Institution geben müssen, für die kurze Zeit welche diese noch leben wird. Ihre Mutter hat sie in der sehr belastenden Zeit der Scheidung uneingeschränkt unterstützt und dafür möchte die Tochter ihr etwas zurückgeben und auch einen Wunsch erfüllen. Sie bittet ihren Arzt in dieser Situation um ein „Aufputschmittel".

9.1 Was würden Sie in der geschilderten Situation tun?

a.	Ich würde in solchen Situationen nur dann Medikamente verschreiben, wenn Spitex oder Ähnliches nicht (genügend) helfen.	$_1$❒ Ja	$_2$❒ Nein
b.	Ich würde ein Medikament wie Ritalin, Modasomil, Antidepressiva oder Antidementiva verschreiben.	$_1$❒ Ja	$_2$❒ Nein
c.	Ich verschreibe in solchen Situationen grundsätzlich keine Medikamente.	$_1$❒ Ja	$_2$❒ Nein
d.	Ich verschreibe in solchen Situationen keine Medikamente, verweise aber auf die Möglichkeit andere Kollegen aufzusuchen oder im Internet zu bestellen.	$_1$❒ Ja	$_2$❒ Nein

9.2 Wenn Sie in der letzten Frage Medikamente verschrieben hätten: Welche der folgenden Substanzen würden Sie in der geschilderten Situation verschreiben?

Sonst bitte weiter zu 9.3.

a.	Methylphenidat (Ritalin®)	$_1$❒ Ja	$_0$❒ Vielleicht	$_2$❒ Nein
b.	Modafinil (Modasomil®)	$_1$❒ Ja	$_0$❒ Vielleicht	$_2$❒ Nein
c.	Antidepressiva	$_1$❒ Ja	$_0$❒ Vielleicht	$_2$❒ Nein
d.	Antidementiva	$_1$❒ Ja	$_0$❒ Vielleicht	$_2$❒ Nein
e.	Betablocker	$_1$❒ Ja	$_0$❒ Vielleicht	$_2$❒ Nein

9.3 Kennen Sie entsprechende Anfragen aus Ihrer Praxis?

$_1$❒ Ja $_2$❒ Nein (->bitte weiter zu Beispiel 10)

9.3.1 Wie häufig sind Sie mit vergleichbaren Anfragen konfrontiert?

❒$_1$	❒$_2$	❒$_3$	❒$_4$	❒$_5$	❒$_6$
äusserst selten	1-2 mal jährlich	4-6 mal jährlich	monatlich	wöchentlich	täglich

9.3.2 Haben Sie in einer solchen Situation / in solchen Situationen eines oder mehrere der folgenden Medikamente verschrieben?

a.	Methylphenidat (Ritalin®)	$_1$❒ Ja	$_2$❒ Nein
b.	Modafinil (Modasomil®)	$_1$❒ Ja	$_2$❒ Nein
c.	Antidepressiva	$_1$❒ Ja	$_2$❒ Nein
d.	Antidementiva	$_1$❒ Ja	$_2$❒ Nein
e.	Betablocker	$_1$❒ Ja	$_2$❒ Nein

10 Eine 24j. Frau, welche sich als sehr schüchtern bezeichnet und im Umgang mit Männern recht unsicher ist, möchte ihre Hemmungen loswerden. Sie wünscht sich von ihrem Arzt ein Mittel, das ihre ängstliche Verkrampftheit günstig beeinflusse. Sie wolle eben auch eher so sein können wie ihre Freundinnen, die schon alle eine Beziehung hätten. Eine Freundin habe wegen einer sozialen Phobie ein Medikament bekommen, das sie nun auch gerne ausprobieren würde.

10.1 Was würden Sie in der geschilderten Situation tun?

a.	Ich würde in solchen Situationen nur dann Medikamente verschreiben, wenn psychotherapeutische Verfahren oder Ähnliches nicht (genügend) helfen.	$_1$❒ Ja	$_2$❒ Nein
b.	Ich würde ein Medikament wie Ritalin, Modasomil, Antidepressiva oder Antidementiva verschreiben.	$_1$❒ Ja	$_2$❒ Nein
c.	Ich verschreibe in solchen Situationen grundsätzlich keine Medikamente.	$_1$❒ Ja	$_2$❒ Nein
d.	Ich verschreibe in solchen Situationen keine Medikamente, verweise aber auf die Möglichkeit andere Kollegen aufzusuchen oder im Internet zu bestellen.	$_1$❒ Ja	$_2$❒ Nein

10.2 Wenn Sie in der letzten Frage Medikamente verschrieben hätten: Welche der folgenden Substanzen würden Sie in der geschilderten Situation verschreiben?

Sonst bitte weiter zu 10.3.

a.	Methylphenidat (Ritalin®)	$_1$❒ Ja	$_0$❒ Vielleicht	$_2$❒ Nein
b.	Modafinil (Modasomil®)	$_1$❒ Ja	$_0$❒ Vielleicht	$_2$❒ Nein
c.	Antidepressiva	$_1$❒ Ja	$_0$❒ Vielleicht	$_2$❒ Nein
d.	Antidementiva	$_1$❒ Ja	$_0$❒ Vielleicht	$_2$❒ Nein
e.	Betablocker	$_1$❒ Ja	$_0$❒ Vielleicht	$_2$❒ Nein

10.3 Kennen Sie entsprechende Anfragen aus Ihrer Praxis?

$_1$❒ Ja $_2$❒ Nein (->bitte weiter zu Beispiel 11)

10.3.1 Wie häufig sind Sie mit vergleichbaren Anfragen konfrontiert?

❒$_1$	❒$_2$	❒$_3$	❒$_4$	❒$_5$	❒$_6$
äusserst selten	1-2 mal jährlich	4-6 mal jährlich	monatlich	wöchentlich	täglich

10.3.2 Haben Sie in einer solchen Situation / in solchen Situationen eines oder mehrere der folgenden Medikamente verschrieben?

a.	Methylphenidat (Ritalin®)	$_1$❒ Ja	$_2$❒ Nein
b.	Modafinil (Modasomil®)	$_1$❒ Ja	$_2$❒ Nein
c.	Antidepressiva	$_1$❒ Ja	$_2$❒ Nein
d.	Antidementiva	$_1$❒ Ja	$_2$❒ Nein
e.	Betablocker	$_1$❒ Ja	$_2$❒ Nein

11 Ein renommierter Wissenschafter, der soeben von einer Kongressreise zurückgekehrt ist, leidet unter einem Jetlag und wünscht deshalb eine Verschreibung von Modafinil, da er so bald wie möglich wieder voll leistungsfähig sein muss. Eine wichtige Tagung steht demnächst an. Er bittet seinen Hausarzt um die Verschreibung eines entsprechenden "Wachmachers".

11.1 Was würden Sie in der geschilderten Situation tun?

a.	Ich würde in solchen Situationen nur dann Medikamente verschreiben, wenn psychotherapeutische Verfahren oder Ähnliches nicht (genügend) helfen.	$_1$❒ Ja	$_2$❒ Nein
b.	Ich würde ein Medikament wie Ritalin, Modasomil, Antidepressiva oder Antidementiva verschreiben.	$_1$❒ Ja	$_2$❒ Nein
c.	Ich verschreibe in solchen Situationen grundsätzlich keine Medikamente.	$_1$❒ Ja	$_2$❒ Nein
d.	Ich verschreibe in solchen Situationen keine Medikamente, verweise aber auf die Möglichkeit andere Kollegen aufzusuchen oder im Internet zu bestellen.	$_1$❒ Ja	$_2$❒ Nein

11.2 Wenn Sie in der letzten Frage Medikamente verschrieben hätten: Welche der folgenden Substanzen würden Sie in der geschilderten Situation verschreiben?

Sonst bitte weiter zu 11.3.

a.	Methylphenidat (Ritalin®)	$_1$❒ Ja	$_0$❒ Vielleicht	$_2$❒ Nein
b.	Modafinil (Modasomil®)	$_1$❒ Ja	$_0$❒ Vielleicht	$_2$❒ Nein
c.	Antidepressiva	$_1$❒ Ja	$_0$❒ Vielleicht	$_2$❒ Nein
d.	Antidementiva	$_1$❒ Ja	$_0$❒ Vielleicht	$_2$❒ Nein
e.	Betablocker	$_1$❒ Ja	$_0$❒ Vielleicht	$_2$❒ Nein

11.3 Kennen Sie entsprechende Anfragen aus Ihrer Praxis?

$_1$❒ Ja $_2$❒ Nein (->bitte weiter zu Frage 12)

11.3.1 Wie häufig sind Sie mit vergleichbaren Anfragen konfrontiert?

❒$_1$	❒$_2$	❒$_3$	❒$_4$	❒$_5$	❒$_6$
äusserst selten	1-2 mal jährlich	4-6 mal jährlich	monatlich	wöchentlich	täglich

11.3.2 Haben Sie in einer solchen Situation / in solchen Situationen eines oder mehrere der folgenden Medikamente verschrieben?

a.	Methylphenidat (Ritalin®)	$_1$❒ Ja	$_2$❒ Nein
b.	Modafinil (Modasomil®)	$_1$❒ Ja	$_2$❒ Nein
c.	Antidepressiva	$_1$❒ Ja	$_2$❒ Nein
d.	Antidementiva	$_1$❒ Ja	$_2$❒ Nein
e.	Betablocker	$_1$❒ Ja	$_2$❒ Nein

12 Falls Sie noch Bemerkungen zu den Fallbeispielen haben, dürfen Sie gerne einen Kommentar schreiben.

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Persönlicher Umgang und Haltung

13 Die folgenden Aussagen stammen aus Interviews mit klinisch tätigen Ärzten / Ärztinnen. Welche Kriterien oder Überlegungen sind für Sie in Fällen wie oben dargestellt für eine allfällige Verschreibung ausschlaggebend? Oder wenn Sie noch nie damit konfrontiert waren, welche Fälle kämen für Sie in Frage? (Mehrfachantworten möglich)

a.	Der subjektive Leidensdruck ist gross.	$_1$❒ Ja	$_2$❒ Nein
b.	Eher bei einem zeitlich begrenzten Einsatz als auf unbestimmte Zeit.	$_1$❒ Ja	$_2$❒ Nein
c.	Wenn Schlimmeres verhindert werden kann.	$_1$❒ Ja	$_2$❒ Nein
d.	Wenn der Betroffene nichts für die Situation kann, in der er sich befindet.	$_1$❒ Ja	$_2$❒ Nein
e.	Ob das Ziel, das damit möglichst besser erreicht werden soll, nachvollziehbar wichtig und wertvoll ist, allenfalls auch Dritten zugute kommt.	$_1$❒ Ja	$_2$❒ Nein
f.	Wenn klar ist, dass sich der Betroffene genug angestrengt hat, um es aus eigenen Kräften zu schaffen.	$_1$❒ Ja	$_2$❒ Nein

14 Persönliche Haltung

		Stimme zu	Unentschieden	Stimme nicht zu
a)	Als Arzt / Ärztin lehne ich NE ab und würde keinesfalls entsprechende Substanzen verschreiben.	$_1$❒	$_0$❒	$_2$❒
b)	Bei NE kommt es auf die Situation an: Ich sage nicht grundsätzlich nein.	$_1$❒	$_0$❒	$_2$❒
c)	Wenn der Anfragende über die Nebenwirkungen und Risiken des gewünschten Präparates aufgeklärt ist und sich dafür entschieden hat, dann respektiere ich die Entscheidung und verschreibe das Präparat.	$_1$❒	$_0$❒	$_2$❒

15 Bitte bewerten Sie die folgenden Aussagen:

15.1 Jeder Arzt / Ärztin sollte selber entscheiden, ob er NE praktizieren möchte oder nicht.

❒$_1$ völlig falsch ❒$_2$ ziemlich falsch ❒$_3$ unentschieden ❒$_4$ ziemlich richtig ❒$_5$ völlig richtig

15.2 Neuroenhancement-Praktiken sind eine Realität. Da dies nun mal so ist, sollten sie zum Wohle des Anfragenden Teil der ärztlichen Tätigkeit werden. So kann die Beurteilung und Überwachung von Risiken und Nebenwirkungen gewährleistet werden.

❒$_1$ völlig falsch ❒$_2$ ziemlich falsch ❒$_3$ unentschieden ❒$_4$ ziemlich richtig ❒$_5$ völlig richtig

15.3 Das Arztbild nimmt Schaden und das Vertrauen der Patienten in ihre Ärzte / Ärztinnen sinkt, wenn die Ärzte / Ärztinnen sich immer mehr von der eigentlichen Krankheitsbehandlung weg bewegen.

❒$_1$ völlig falsch ❒$_2$ ziemlich falsch ❒$_3$ unentschieden ❒$_4$ ziemlich richtig ❒$_5$ völlig richtig

Universität Zürich[UZH]

Substanzen

16 Welche der unten aufgeführten Substanzen können Ihrer Meinung nach auch bei gesunden Personen eine Wirkung haben und die Leistungsfähigkeit bzw. das psychische Wohlbefinden steigern? Welche Nebenwirkungen können sie, falls möglich, bei gesunden Personen auslösen?

16.1 Antidepressiva (Mehrfachantworten möglich)

16.1.1 Wirkung bei Gesunden		16.1.2 Nebenwirkung bei Gesunden	
a. Nein, keine Wirkung bei gesunden Personen	❐1	a. Abhängigkeit	❐1
b. Ja, Steigerung der Konzentrationsfähigkeit	❐1	b. Nervosität/Schlafstörungen	❐1
c. Ja, Steigerung der Wachheit	❐1	c. Arrhythmien	❐1
d. Ja, Steigerung von Merkfähigkeit, Gedächtnis	❐1	d. Leberfunktionsstörungen	❐1
e. Ja, Stimmungshebung	❐1	e. Wahnvorstellungen	❐1
f. Ja, andere	❐1	f. Blutbildveränderungen	❐1
g. Ich habe keine Erfahrung mit diesen Medikamenten	❐1	g. Weitere: ……. ……	❐1
		h. Nein, keine	❐1

16.2 Ginkgo (Mehrfachantworten möglich)

16.2.1 Wirkung bei Gesunden		16.2.2 Nebenwirkung bei Gesunden	
a. Nein, keine Wirkung bei gesunden Personen	❐1	a. Abhängigkeit	❐1
b. Ja, Steigerung der Konzentrationsfähigkeit	❐1	b. Nervosität/Schlafstörungen	❐1
c. Ja, Steigerung der Wachheit	❐1	c. Arrhythmien	❐1
d. Ja, Steigerung von Merkfähigkeit, Gedächtnis	❐1	d. Leberfunktionsstörungen	❐1
e. Ja, Stimmungshebung	❐1	e. Wahnvorstellungen	❐1
f. Ja, andere	❐1	f. Blutbildveränderungen	❐1
g. Ich habe keine Erfahrung mit diesem Medikament	❐1	g. Weitere: …… ……	❐1
		h. Nein, keine	❐1

16.3 Methylphenidat (Ritalin®) (Mehrfachantworten möglich)

16.3.1 Wirkung bei Gesunden		16.3.2 Nebenwirkung bei Gesunden	
a. Nein, keine Wirkung bei gesunden Personen	❐1	a. Abhängigkeit	❐1
b. Ja, Steigerung der Konzentrationsfähigkeit	❐1	b. Nervosität/Schlafstörungen	❐1
c. Ja, Steigerung der Wachheit	❐1	c. Arrhythmien	❐1
d. Ja, Steigerung von Merkfähigkeit, Gedächtnis	❐1	d. Leberfunktionsstörungen	❐1
e. Ja, Stimmungshebung	❐1	e. Wahnvorstellungen	❐1
f. Ja, andere	❐1	f. Blutbildveränderungen	❐1
g. Ich habe keine Erfahrung mit diesem Medikament	❐1	g. Weitere: …… ……	❐1
		h. Nein, keine	❐1

16.4 Antidementiva (Mehrfachantworten möglich)

16.4.1 Wirkung bei Gesunden		16.4.2 Nebenwirkung bei Gesunden	
a. Nein, keine Wirkung bei gesunden Personen	❐1	a. Abhängigkeit	❐1
b. Ja, Steigerung der Konzentrationsfähigkeit	❐1	b. Nervosität/Schlafstörungen	❐1
c. Ja, Steigerung der Wachheit	❐1	c. Arrhythmien	❐1
d. Ja, Steigerung von Merkfähigkeit, Gedächtnis	❐1	d. Leberfunktionsstörungen	❐1
e. Ja, Stimmungshebung	❐1	e. Wahnvorstellungen	❐1
f. Ja, andere	❐1	f. Blutbildveränderungen	❐1
g. Ich habe keine Erfahrung mit diesen Medikamenten	❐1	g. Weitere: …… ……	❐1
		h. Nein, keine	❐1

16.5 Modafinil (Modasomil®) (Mehrfachantworten möglich)

16.5.1 Wirkung bei Gesunden		16.5.2 Nebenwirkung bei Gesunden	
a. Nein, keine Wirkung bei gesunden Personen	❐1	a. Abhängigkeit	❐1
b. Ja, Steigerung der Konzentrationsfähigkeit	❐1	b. Nervosität/Schlafstörungen	❐1
c. Ja, Steigerung der Wachheit	❐1	c. Arrhythmien	❐1
d. Ja, Steigerung von Merkfähigkeit, Gedächtnis	❐1	d. Leberfunktionsstörungen	❐1
e. Ja, Stimmungshebung	❐1	e. Wahnvorstellungen	❐1
f. Ja, andere	❐1	f. Blutbildveränderungen	❐1
g. Ich habe keine Erfahrung mit diesem Medikament	❐1	g. Weitere: …… ……	❐1
		h. Nein, keine	❐1

17 Falls Sie noch Bemerkungen zu den erwähnten Substanzen oder allgemein zum Thema Neuroenhancement sowie diesem Fragebogen haben, dürfen Sie gerne einen Kommentar schreiben.

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Vielen Dank für Ihre Mithilfe!

B Interviewed and cited in Newspapers

B.1 Interview in Tages-Anzeiger, daily Newspaper in Switzerland, 2013. German.

B.2 Cited in Newspapers (German and French)

a) In Gezetera, Student Magazine of University of Basel, Switzerland, 2011. German.

b) In NZZ Campus, online, Switzerland, 2011. German.

c) In NZZ Campus, Quarterly Magazine, Switzerland, 2011. German.

d) In Tribune de Genève, daily Newspaper in Switzerland, 2013. French.

Wissen

Zum Schreien

Neugeborene, die permanent weinen, können ihre Eltern in die Verzweiflung treiben. Forscher raten, mit dem Schreibaby eine Schreiambulanz aufzusuchen.

Von Birgit Herden

Sie hatte sich auf diese ersten Monate gefreut, doch dann wurde die Mutterschaft zum Albtraum. Die neugeborene Tochter schrie und schrie, das kleine Gesicht hochrot, alle Muskeln angespannt, der ganze Körper versteift. Das Kind liess sich einfach nicht beruhigen. Kein Stillen oder Wiegen, liebesvolles Zureden oder Streicheln half. Das Baby schien in unstillbarem Zorn und Schmerz gefangen zu sein – unerreichbar für die Eltern. «Ich habe mich wie ein Häufchen Dreck gefühlt», erinnert sich die Mutter Karin B., die ihren Namen nicht veröffentlichen möchte. «Ganz offensichtlich brachte ich die einfachste Sache der Welt nicht zustande – mein Kind glücklich zu machen.» Das Gebrüll trieb sie beinahe in den Wahnsinn.

Vielleicht hätte es Katrin B. damals geholfen, wenn sie gewusst hätte, wie häufig junge Mütter unter ähnlichen Gefühlen leiden: Je nach Definition legen 5 bis 25 Prozent aller Babys das sogenannte «exzessive Schreien» an den Tag. Grob gesagt gilt ein Kind als Schreibaby, wenn es an drei oder mehr Tagen der Woche mindestens drei Stunden lang schreit. Nach Meinung der Fachleute reicht als Indikation das Gefühl der Eltern, es mit dem eigenen Kind nicht mehr auszuhalten. Sie geraten dadurch meist in einen Teufelskreis. Tipps, wie der sich durchbrechen und das Kind beruhigen lasse, gibt es zwar viele. Doch wie wirksam sind die einzelnen Methoden? Hilft überhaupt irgendetwas?

Entgegen der verbreiteten Meinung sind Koliken meist nicht die Ursache für Schreikrämpfe von Neugeborenen. Foto: Getty Images

Placebo statt Fenchelsamenöl

Diese Fragen hat nun das Deutsche Institut für Medizinische Dokumentation und Information (Dimdi) untersuchen lassen. Fazit: Am besten kommen psychotherapeutische Ansätze weg. Den meisten anderen untersuchten Therapien stehen die Prüfer mindestens skeptisch gegenüber.

In die Bewertung sind die Ergebnisse von 18 Studien eingeflossen, die zum Teil wiederum mehrere Einzelstudien auswerteten. Die Mehrzahl der Untersuchungen stammt aus den USA und aus Grossbritannien. Vier der Studien befassen sich mit der Wirkung pflanzlicher Mittel, mit denen Säuglinge im Spital behandelt werden, oder mit der Ernährung der Mutter, etwa wenn diese auf Milchprodukte verzichtet. Für eine Untersuchung in Russland wurden 125 Schreibabys in zwei Gruppen aufgeteilt. Die eine Kindergruppe erhielt Placebos, die andere eine Woche lang viermal täglich eine Emulsion aus Fenchelsamenöl. Am Ende hatte sich in der behandelten Gruppe bei zwei Dritteln das Schreien vollständig gelegt, in der Placebo-Gruppe war es ein knappes Viertel.

Falsche Behandlungsansätze

Dennoch sehen die Prüfer die Ergebnisse dieser Studien mit grosser Vorsicht. Es sei unklar, inwieweit die Spitalatmosphäre eine Rolle spielte und ob sich die Resultate auf die Situation zu Hause übertragen lassen. Zudem beruhen die Behandlungsansätze auf der veralteten Vorstellung, bei dem unstillbaren Schreien handle es sich in der Regel um eine sogenannte Dreimonatskolik. Diese Erklärung gilt medizinisch als überholt. «Die Eltern sollten es ruhig erst mit den Hausmitteln versuchen», sagt Dieter Korczak, ein Autor der Dimdi-Analyse. Beliebt bei Eltern ist auch das blähungslösende Mittel Sab simplex. «Aber Dreimonatskoliken sind sicher nicht der wesentliche Grund für exzessives Schreien», saht Korczak.

Noch skeptischer ist der Mediziner bei der Bewertung chiropraktischer Behandlungen. Chiropraktiker oder Osteopathen versuchen Schreibabys vom sogenannten Kiss-Syndrom zu befreien, eine «Kopfgelenk-induzierte Symmetrie-Störung», die nach Meinung mancher Alternativmediziner die Ursache für das Schreien ist. Dass solch eine Störung überhaupt existiert, ist aus Sicht der evidenzbasierten Medizin nicht überzeugend bewiesen. Auch die Dimdi-Prüfer kritisieren Studien als qualitativ mangelhaft, denen zufolge die Kiss-Therapie wirken soll. So fehlten zum Beispiel Kontrollgruppen, oder die Zahl der untersuchten Fälle war zu klein, um daraus statistisch relevante Folgerungen abzuleiten. «Oft gab es gar keine Diagnose für das Syndrom», sagt Korczak. «Ich rate hier zur Vorsicht, denn es gibt keine Behandlung ohne Nebenwirkungen.»

Positiv fiel indes die Bewertung der verschiedenen psychotherapeutischen Betreuungsangebote aus. Mehrere Untersuchungen zeigten, dass die Beratung und Begleitung durch Krankenschwestern, Psychologen und Ärzte das Schreien der Kinder und den Stress der Eltern oft schon nach wenigen Tagen deutlich mindern können. In den meisten Fällen findet man keinen organischen Auslöser für das Dauergebrüll. Psychologen und Kinderärzte vermuten eine unspezifische «Regulationsstörung» – die Babys können auf Reize und Eindrücke in ihrer Umgebung nicht angemessen reagieren.

Suche nach dem «Engelskreis»

Wie es dazu kommen kann, ist unklar. In der Diskussion stehen zum Beispiel Stress und Ängste während der Schwangerschaft, die sich auf das Ungeborene auswirken können, oder auch eine schwierige Geburt. Klar ist aber, dass das Dauergebrüll die Beziehung zu den Eltern und die Mutter-Kind-Bindung stark stören kann. Babys werden im Normalfall von ihren Eltern fortwährend beruhigt oder angeregt, und normalerweise fühlen sich die Eltern durch die Reaktionen ihres Kindes bestärkt, was sie in ihrem Umgang sicherer macht. Ein solcher «Engelskreis» aber entsteht bei Schreibabys oft nicht. Zudem bringen die Eltern häufig auch eigene Unsicherheiten und Ängste mit, die durch die unverständliche Reaktion des Kindes noch verstärkt werden.

Die Mehrzahl der neun ausgewerteten Einzelstudien und Übersichtsarbeiten zur psychotherapeutischen Behandlung stufen die Dimdi-Prüfer als methodisch gut ein. Allerdings bezogen sich die meisten dieser Studien auf Beratungen, die entweder zu Hause oder während eines mehrtägigen Krankenhausaufenthalts stattfanden. Ambulante Beratung wurde nur in fünf US-Studien untersucht. Sie brachte überwiegend gute Ergebnisse, allerdings gibt es keinen direkten Vergleich mit der stationären oder häuslichen Betreuung.

Auch wenn Korczak weiteren Forschungsbedarf sieht, lautet sein Fazit: «Ich würde allen Eltern mit Schreibabys raten, möglichst rasch eine Schreiambulanz aufzusuchen, damit die Probleme nicht chronisch werden.» Katrin B. hat dies nie gemacht. «Ich wollte es selbst schaffen und nicht öffentliche Hilfe in Anspruch nehmen», sagt die junge Mutter. «Damit hätte ich mich noch mehr als Versagerin gefühlt.»

Von alleine zur Ruhe gekommen

Um solche Vorbehalte abzubauen, sei eine niederschwellige Unterstützung notwendig, bei der schon Geburtsstationen und Hebammen Warnsignale erkennen und Hilfe anbieten, sagt Korczak. Auch beim Schlafen oder Essen kann es zu Problemen kommen. Das Schreien ist besonders gefährlich, weil es Aggressionen weckt. Im schlimmsten Fall wird das Kind von verzweifelten Eltern geschüttelt, wodurch es zu Hirnblutungen kommen kann, die bleibende Schäden verursachen oder tödlich enden können. Welche Spuren die albtraumhaften ersten Monate bei Schreikindern und Eltern ansonsten hinterlassen, darüber weiss man wenig.

In den allermeisten Fällen klingt das Gebrüll nach dem dritten Lebensmonat von alleine ab. Bei der Tochter von Katrin B. dauerte es ein bisschen länger. Doch auch dieses Kind hörte auf zu schreien. «Was immer damals unser Problem war», sagt die Mutter, «heute ist meine Tochter zauberhaft.»

Wissen im Comic Die exotische Speisekarte der Mistkäfer

Über zwei Jahre haben Forscher von der University of Nebraska-Lincoln 9000 Mistkäfer von insgesamt 15 verschiedenen Arten eingefangen. Dabei stellten sie fest, dass die unscheinbaren Tierchen den Dung von Allesfressern im Gegensatz zu dem von Pflanzenfressern deutlich bevorzugen.

Small Talk

«Die Liste der möglichen Stoffe ist lang»

Die Neurobiologin Regula Ott sagt, dass während des Studiums mehr Männer als Frauen leistungsfördernde Wirkstoffe nehmen.

Mit Regula Ott sprach Barbara Reye

In Deutschland hat offenbar jeder fünfte Student mindestens einmal im vergangenen Jahr von sich aus leistungsfördernde Mittel wie Ritalin genommen. Ist Hirndoping an Hochschulen so verbreitet?
Die Zahlen in der vor kurzem veröffentlichten Studie der Universität Mainz sind recht hoch. Dies könnte auch daran liegen, dass die Forscher nach sehr vielen Produkten gefragt haben, die zur Steigerung der Aufmerksamkeit, Wachheit sowie der Stimmung genommen worden sind. Das Spektrum reichte von Koffeintabletten bis zu Kokain. Wichtig bei solchen Daten ist es deshalb, die Definition von Hirndoping sowie von den Substanzen genauer anzuschauen.

Wie sieht es in der Schweiz aus?
Im Rahmen meiner Dissertation habe ich 1765 Studierende an der Universität Zürich befragt. Allerdings war dies keine repräsentative Umfrage, sondern es ging vielmehr darum, die Nutzer mit den Nichtnutzern zu vergleichen. Aus den Ergebnissen geht hervor, dass rund 5 Prozent schon mindestens einmal Arzneimittel wie Ritalin, Adderall oder Modasomil genommen haben, um als gesunde Person ihre Konzentration oder Wachsamkeit zu steigern. Dabei kam unter anderem auch heraus, dass mehr Männer als Frauen solche Produkte nahmen und dass sie bereits auch mehr Erfahrung mit anderen Drogen hatten. Repräsentative Zahlen werden zurzeit am Schweizer Institut für Sucht- und Gesundheitsforschung ausgewertet.

Regula Ott (28)
Die Neurobiologin ist Doktorandin am Institut für Biomedizinische Ethik der Universität Zürich und forscht zum Thema Medizin für Gesunde.

Um gegen Müdigkeit anzukämpfen, nehmen Indios seit Jahrhunderten Koka oder Menschen in einigen Gegenden Asiens Betel. Wäre es nicht besser, gewisse Aufputschmittel zu legalisieren, als sie auf dem Schwarzmarkt oder im Internet zu erwerben?
Im Prinzip schon, aber ich finde es wichtig, dass wir zuvor zwei Aspekte diskutieren: Erstens wissen wir heute noch zu wenig über Wirkung und Nebenwirkung von Ritalin, Adderall oder Modasomil bei Gesunden, sodass noch weitere Studien notwendig wären. Nur würden dafür letztlich Gelder genutzt werden, die dann für die Erforschung von Medikamenten für kranke Menschen wiederum fehlen würden. Zweitens sollten wir uns vor einer Legalisierung darüber im Klaren sein, was für Ziele wir in unserer Gesellschaft erreichen wollen.

Was heisst das?
Wir müssen uns fragen, ob wir ein leistungsförderndes Produkt legalisieren möchten, um länger arbeiten zu können und dafür auch Nebenwirkungen in Kauf zu nehmen. Oder ob wir dies sogar als unsere Pflicht ansehen, um das Maximum aus uns herauszuholen.

Wird es mal so weit kommen, dass Studenten nach einer Prüfung zum Dopingtest antreten müssen?
Wir sind noch lange nicht an diesem Punkt. Dafür zeigen die Studien zu diesen Stimulanzien eine zu kleine Wirkung. Aber wer weiss, die Liste von möglichen Substanzen zur Leistungssteigerung ist lang und daher die Chance gross, dass wir eines Tages solche Wirkstoffe haben. Daher lohnt es sich, wenn wir uns als Gesellschaft bereits jetzt Gedanken darüber machen, wie wir mit solchen Produkten umgehen möchten.

Superbrain me! – Der Doktor hilft beim Studium

Kalter Kaffee? Wie Neuro-Enhancement das Studium verändert, die Persönlichkeit spaltet und Akademiker zu illegalen Beschaffungsmethoden verleitet.

Wir nutzen lediglich 15-20% unseres Gehirns, der Rest ist brachliegendes Potential. Im Film «Limitless», der dieses Jahr in die Kinos kam, wird ein Szenario präsentiert, in dem das mentale Potential eines Menschen voll ausgenutzt wird. Der Hauptcharakter Eddie, ein junger, erfolgloser Schriftsteller gelangt in Besitz einer neuartigen Wunderdroge, die ihn über Nacht befähigt, sein Leben in den Griff zu kriegen, innert Tagen Fremdsprachen zu lernen, einen Bestseller-Roman zu veröffentlichen, an den Finanzmärkten ein Vermögen aufzubauen und ihn am Ende sogar in die Nähe des höchsten politischen Amtes in den USA bringt. Natürlich hat das Ganze einen Haken. Setzt man die Droge ab, machen sich starke Entzugs- und Zerfallserscheinungen bemerkbar – wer zu spät aussteigt riskiert gar das eigene Leben. Bezeichnenderweise verzichtet der Film vollständig auf eine moralische Auflösung des Dilemmas. Die Lösung des Problems ist letztlich technologischer Art. Auch wenn der Film nur stellenweise überzeugt und selbst höchstens 20% des im Skript liegenden Potentials zu nutzen weiss, scheint er doch irgendwie den Nerv unserer Zeit zu treffen. Was manchen noch als science fiction erscheint, ist in gewisser Weise längst Realität. Verfügen wir womöglich bereits über einen Prototyp einer solchen Superdroge?

C14 H19 NO2 – hinter dieser Formel verbirgt sich eine Substanz, die zurzeit in aller Munde ist – wortwörtlich. Es handelt sich um *Methylphenidat*, bekannter unter dem Markennamen *Ritalin*. Nach bescheidenen Anfängen – man wusste nicht so recht, wofür oder wogegen man Ritalin einsetzen sollte – entwickelte sich für Ciba (heute Novartis) ein Kassenschlager daraus. Heute ist Ritalin das wohl bekannteste Medikament gegen ADHS und *die* Droge der heutigen Akademikergeneration.

Dass akademische Kreise mit Drogenkonsum in Verbindung gebracht werden ist an sich nichts Neues. In deutschen Studentenkellern des 19. Jhd. mischten sich nicht nur ‹revolutionäres› gedankengut und Nationalismus, sondern auch Bier und Gesang. Gegen eben jenen ‹nationalen Mief› zogen dann die 68er mit Marijuana und LSD zu Felde. Die unpolitischen Yuppies der 80er hatten Kokain, die Partypeople und Raver der 90er MDMA. Wir haben Ritalin.

Im Westen nichts Neues soweit. Was sich jedoch gewandelt hat, ist die Funktion des Drogenkonsums. Während es sich bei den meisten der aufgezählten Substanzen grob gesagt um ‹Spassdrogen› handelt, stellt Ritalin das Paradebeispiel einer Leistungsdroge dar. Ging es früher womöglich noch darum, sich aus dem Funktionsgefüge der Leistungswelt herauszureissen, also gerade darum nicht mehr zu funktionieren und sich gewissermassen ‹unbrauchbar› für die Gesellschaft und ihre Normen zu machen, so ist das Verhältnis heute gerade umgekehrt: man nimmt Drogen, um den Anforderungen der Leistungsgesellschaft zu genügen.

Natürlich sollte man weder die Vergangenheit noch Drogen allzu sehr romantisieren, dennoch scheinen wir ihnen, im Kontrast zu früher, mit einer neuartigen Nüchternheit gegenüberzutreten. Mitunter wird vor der Einnahme gezielt recherchiert und penibel geplant. So lässt sich jeder Lebenssituation eine Substanz zuordnen – Aufstehen, Uni, Nebenjob, Sport, Ausgang, Schlafengehen. Mit ein wenig Chemie in unseren Händen, werden wir zu Meistern unseres eigenen Schicksals.

Ohnehin scheint in diesem Zusammenhang das Wort ‹Droge› inadäquat und weckt falsche Assoziationen. Was heute geschieht lässt sich besser unter den Begriff ‹Doping› fassen, zumal Mittel wie Ritalin nicht eingenommen werden, um der eigenen Persönlichkeit vorübergehend zu entfliehen oder diese zu erweitern, sondern schlicht um gewisse mentale Eigenschaften zu verbessern; kurz Neuro-Enhancement. Doping, bislang etwas, das man hauptsächlich mit der Olympiade und der Tour de France in Verbindung brachte, hat sich längst in unseren Alltag eingeschlichen. Betablocker nehmen uns die Angst, Prozac schenkt uns neues Selbstvertrauen, Ritalin hilft sich zu fokussieren, mit Vigil und Modafinil bleibt man auch die Nacht durch hellwach.

Foto: Sandra Amport

Ein Randphänomen? Keineswegs, sagt uns die Statistik. Je nachdem welche man zu Rate zieht, verwendet bis zu ein Drittel der Studierenden an amerikanischen Universitäten leistungssteigernde Medikamente für «nichtmedizinische Zwecke». Seit einiger Zeit rücken nun auch die Dozierenden ins Blickfeld, spätestens seit in der renommierten Fachzeitschrift «Nature» Wissenschaftler in einer anonymen Umfrage gestanden, für ihre Arbeit regelmässig auf Substanzen wie Aderall (in den USA die ‹study drug› schlechthin, nahe verwandt mit Amphetaminen) zurückzugreifen (Quelle: Nature 452, 2008).

> Ging es früher womöglich noch darum, sich aus dem Funktionsgefüge der Leistungswelt heraus zureissen der Leistungsfähigkeit oder als Partydroge.

> *«Methylphenidat hat eine ähnliche Struktur wie MDMA, bekannter unter dem Namen Ecstasy.(…) In der Literatur wird erwähnt, dass es möglich wäre, dass das Suchtpotential bei unterschiedlichen Motivationen zur Einnahme auch verschieden ist.»*
> *(Regula Ott, Doktorandin am Institut für biomedizinische Ethik der Universität Zürich)*

Die Paradoxie des Individualismus

New York, das Szeneviertel Williamsburg in Brooklyn. Jede Menge Bars, Clubs und junge Menschen. Hier trifft man nebst anderen auf Studierende von namhaften Institutionen wie der NYU, Columbia und Cornell. Man ist aufgeschlossen, kommt schnell ins Gespräch. Als Europäer erstaunt vor allem, wie offen mit den Themen Drogen und Neuro-Enhancement

umgegangen wird. Eine junge Studentin erzählt ungeniert, wie sie sich vor der Prüfungsphase über einen Bekannten mit Aderall eindeckt. Jemand bekommt seit der Jugend Ritalin verschrieben und verkauft ab und zu kleinere Menge an Freunde. Wieder jemand anderes gibt zu, ein- bis zweimal pro Woche Kokain zu nehmen. Niemand scheint sich darüber zu empören, niemand moralische Bedenken zu haben.

Etwa zur gleichen Zeit in der Schweiz. Die Empörung, die in Brooklyn fehlte, macht sich hier umso stärker breit – zumindest in den Onlineforen und Kommentarseiten diverser Zeitungen. Der Krankenversicherer Helsana veröffentlichte eine Studie, laut der die Verschreibung von Ritalin unter ihren Versicherten seit 2006 um 42% zunahm. Auffällig, im Tessin beziehen fünfmal weniger Menschen Ritalin. Eine Frage der Mentalität der Kultur oder eines, den Tessinern eigenen, Relax-Gens? «Schlechte Eltern, Versagen der Schule, Unnatürlich!», so das Echo vieler Leser. Ein halbes Jahr später wird eine neue Studie erscheinen und das Ritual von vorne beginnen. An der Zunahme des Ritalinkonsums wird dies freilich wenig ändern.

Vielleicht sollte man sich emotional distanzieren und einmal die naive Frage stellen: wieso eigentlich nicht? Ist es wirklich so schlimm, dass wir unserem Hirn ab und zu etwas auf die Sprünge helfen? Wer kurzsichtig ist bekommt eine Brille, versagt das Immunsystem verabreichen wir Antibiotika, wir pflanzen uns Herzschrittmacher in die Brust, der Zuckerkranke spritzt sich Insulin. Wieso sollte jemand mit Konzentrationsproblemen nicht eine Pille nehmen dürfen, um seine verschiedenen Neurotransmitter auszubalancieren? Letztlich steckt auch hier womöglich der Jahrtausende alte Wunsch der Menschheit dahinter, nicht mehr gezwungenermassen Spielball von Naturzufällen sein zu müssen, sondern in beschränktem Masse so sein zu können, wie man sein will.

Auffällig, im Tessin beziehen fünfmal weniger Menschen Ritalin. Eine Frage der Mentalität, der Kultur oder eines, den Tessinern eigenen Relax-Gens?

Das Natürlichkeitsargument zieht also nicht, ausser man ist bereit auf jegliche Form medizinischen Fortschritts zu verzichten. Das würde im Schnitt etwa die Halbierung unserer Lebenserwartungen bedeuten. Die meisten ziehen es jedoch vor, 80 zu werden und das zu Recht. Auch die Doping-Analogie und ihre ethische Implikation ist zu hinterfragen. Beschweren wir uns beim Chef, wenn unser Kollege Espresso trinkt? Wohl kaum, obwohl sich Koffein und Ritalin in ihrer Wirkung nur graduell unterscheiden. Zudem sind Lebensbereiche wie Schule, Wissenschaft und Wirtschaft keine Nullsummenspiele mit klaren Regeln, wie es etwa im Radsport der Fall ist. Des einen Gewinn muss nicht notwendigerweise des anderen Verlust darstellen.

Lässt man solche moralischen Schüsse aus der Hüfte mal beiseite, muss immer noch die Frage nach der gesellschaftlichen Langzeitwirkung gestellt werden. Könnte Neuro-Enhancement auf Dauer unerwünschte Konsequenzen mit sich führen, die wir derzeit noch nicht abzuschätzen vermögen? Diejenigen, die sich dem Trend entziehen, könnten – Talent und Motivation hin oder her – auf lange Frist das Nachsehen haben. Es könnte sich eine starre Zweiklassengesellschaft entwickeln, entlang des Grabens ökonomischer Kaufkraft und Verfügbarkeit pharmakologischer Hilfsmittel. Wobei sich momentan eher eine Demokratisierung des Neuro-Enhancement abzeichnet. Eine Packung Ritalin ist zwar nicht billig, aber für die meisten dennoch erschwinglich.

Die Gefahren, die Neuro-Enhancement birgt sind womöglich viel subtiler. Francis Fukuyama sieht in seinem Buch *Our Posthuman Future: Consequences of the Biotechnology Revolution* weniger das Risiko einer gespaltenen Gesellschaft, als einer um sich greifenden Normalisierung und Normierung des Individuums. Jeder, der sich zu weit aus dem Bauch der Normalverteilung bewegt wird biotechnologisch zurechtgestutzt, respektive ‹verbessert›. Paradoxerweise nutzt das Individuum, die ihm in die Hand gelegten Instrumente zur Selbstbestimmung und Selbstoptimierung ausgerechnet dazu, sich der Masse anzugleichen – kognitive Gleichschaltung.

Wo und wie ausgeprägt man die Gefahren des Hirndopings auch sieht, aus einer soziologischen Langzeitperspektive gedacht, scheint es wahrscheinlich, dass die Gesellschaft, wie auf die meisten technologischen Neuerungen, nach anfänglichen Abwehrreflexen mit einer Normalisierung des Sachverhaltes reagiert (man denke z.B. an die Mobiltelefonie). Neuro-Enhancer werden möglicherweise schon in wenigen Jahren zu unserem Alltag gehören, wie die morgendliche Vitamintablette oder die Fahrplan-App auf unserem smart phone. Wie sagte doch die Rote Königin so schön in Lewis Carrolls *Through the Looking Glass*: «Sometimes it takes all the running you can do, to keep in the same place.»

«Wie in der Literatur erwähnt wird, wurde bislang die Einnahme von Ritalin in keiner Langzeitstudie ergründet. Deswegen kann nicht abgeschätzt werden, ob der Ritalinkonsum einschränkende bzw. präjudizierende Konsequenzen für den jeweiligen Lebensverlauf hat.» (Regula Ott, Doktorandin am Institut für biomedizinische Ethik der Universität Zürich)

Alex und sein Beschaffungsproblem

Doch wie gelangt man überhaupt an ein Medikament wie Ritalin? Das Problem: Ritalin fällt in der Schweiz, wie in den meisten Ländern, unter das Betäubungsmittelgesetz. Konkret bedeutet dies, dass die Abgabe von Ritalin streng kontrolliert wird und Dauerrezepte auf ein paar Monate beschränkt sind.

Im Auftrag der Redaktion gehe ich also der Frage nach, wie man an das Zeug rankommt – aus rein journalistischer Neugier und Pflichtgefühl versteht sich. Noch in New York scheitere ich am Schalter einer ‹pharmacy›. Ohne Rezept läuft gar nichts. Land of the free? Nicht wenn es um Drogen geht. Die Endkonsumenten scheint es nicht weiter abzuhalten.

Sofern man keinen bewaffneten Raubüberfall auf eine Apotheke unternehmen will, gibt es also drei Möglichkeiten: sich ein Rezept schreiben lassen, im Internet bestellen, oder es über einen Bekannten besorgen. Die erste Möglichkeit scheiterte am erwähnten Problem und an meiner Abneigung, mich einer langen Psychotherapie zu unterziehen, nur um an die besagte Substanz zu gelangen.

Ich blicke mich deshalb mal im Internet um. An Angeboten mangelt es nicht, nur ganz koscher wirkt die Sache häufig nicht. Immerhin, strahlende, schöne Menschen in weissen Kitteln schauen den potentiellen Kunden auf vielen Websites fürsorglich an und vermitteln Kompetenz und Professionalität. Schliesslich entscheide ich mich dafür, eine kleine Packung *Strattera* zu bestellen. Dieses, ursprünglich gegen Depression entwickelte Medikament wird heute ebenfalls gegen Aufmerksamkeitsstörungen eingesetzt und hat den schönen Nebeneffekt, dass bislang keine Abhängigkeitsphänomene beobachtet werden konnten. Dafür kann es aggressives und suizidales Verhalten auslösen. Doch halt, ich erinnere mich in einer Sendung des Schweizer Fernsehens gesehen zu haben, dass unsere Zollfandung mittlerweile routinemässig Pakete auf illegale Medikamentenlieferungen überprüft.

Kurzerhand wird ein neuer Mitbewohner erfunden – sicher ist sicher – und auf den Namen Alex getauft (Nachname der Redaktion bekannt). Während Alex auf seine Lieferung wartet, fliege ich derweil in die Ferien. Wieder zurück finde ich eine Nachricht der Post auf meinem Schreibtisch vor. Alex soll sich doch bitte mit Ausweispapieren an der Flughafenapotheke Basel melden. Sackgasse.
Bleibt nur noch Plan C. Ich kenne jemanden, der jemanden kennt, der ...voilà. Ganz so einfach gestaltet es sich natürlich nicht, aber mit etwas Aufwand gelange ich in Besitz einer kleinen Menge Ritalin. Leider viel zu wenig, um eine grossangelegte Studie mit Kontrollgruppe durchzuführen (ich frage mich, wie wohl der durchschnittliche Dozent auf die Substanz reagiert), aber genug für einen Selbstversuch. Diese Aufgabe übernimmt dankenswerterweise meine Redaktionskollegin.

Methylphenidate me! – eine fünftägige Verabredung mit meinem Ritalin-Ich

Freitagabend ist es so weit, die erste kleine Pille findet Eingang in meinen Schlund. Erschrocken begierig warte ich die folgenden Stunden auf eine Wirkung. Sollte dies nicht ein kritischer Artikel werden, bin ich dieser Substanz eigentlich nicht abhold und finde die Verfälschung der Leistungsnorm durch solch leistungssteigernde Substanzen bedenklich? In diesem Moment ist mein alchemistisches Interesse jedoch wesentlich grösser und ich beobachte jede Veränderung meines Körper- und Geisteszustandes penibel. Die Enttäuschung: 20mg Methylphenidat und ich spüre absolut nichts. Etwas beduselt von den vorabendlichen Drinks erwartet mich am nächsten Morgen der Blister mit den restlichen Tabletten, dessen silbernes Antlitz Grenzerfahrung verspricht. Nach der ersten Nichterfahrung verspüre ich das Begehren meine Dosis dem Wikipedia-Artikel gemäss auf die normale Dosis eines ADS-Patienten zu steigern. 60 mg. Mit Musik auf den Ohren an den Rhein, um den erhofften Fokus an einem zu lektorierenden Text auszuprobieren. Beim Gehen über den Asphalt überkommt mich ein Gefühl von Leichtigkeit und Erhabenheit, ich gleite förmlich asphaltierend dem Rheinufer entlang. Jede Bewegung ein koordinatives Kunstwerk, wo ich ansonsten eher einen taumelnden Gang pflege. Euphorie und Deutlichkeit des Gedachten. Niemand und nichts lenkt mich vom Redigieren des Textes ab. Ich und der Text, der Text und ich auf Fokus eingestellt sind wir Welt. Bis sich uns ein Bild in den Weg stellt, ein durch Sprache erzeugtes Bild, von dem ich spüre, dass es ein schiefes ist, das ich in diesem Zustand jedoch nicht geraderücken kann, da mein Fokus keine Gedankenüberlagerungen zulässt. Ich bin eindimensional!

«Wir wissen immer noch nicht, was Intelligenz ist. Wir haben zwar Definitionen, können aber nicht nur an einer Schraube drehen und dann ist man intelligenter. Eine Studie zeigt, dass es möglich sein könnte, dass wir mit Ritalin zwar die Konzentration steigern, jedoch dabei die Kreativität verloren geht.» (Regula Ott, Doktorandin am Institut für biomedizinische Ethik der Universität Zürich)

Über dem Logische-Brücken-schlagen und Fehler-Finden in Rekordzeit ist mir mein Gespür für Worte abhandengekommen. Krampfhaft versuche ich zu assoziieren, Verknüpfungen herzustellen und scheitere an der Tatsache des Wortes, an dem Wort selber, so wie es dasteht. Der Gedanke keimt in mir auf, dass mein Ritalin-Ich sich an dem Wort festkrallen will, es nicht hintergehen möchte, sondern nimmt wie es ist, wie es dasteht. Ich merke wie ich und mein Ritalin-Ich einig werden, das ist Welt, das ist Effizienz, das ist Leistung, das ist Ekstase, das ist Euphorie, das ist eigentliches, wahrhaftiges Dasein, Gleichschaltung! Eine Verabredung zum Essen ruft, zu der ich eine Flasche Wein mitbringen möchte. Im Coop angekommen fälle ich meine Entscheidungen in Millisekundenschnelle und begebe mich schnurstracks zur Kasse, wo eine ältere Dame vor mir steht und die Kassiererin bezüglich eines Zubereitungsvorschlages belästigt. Ja, belästigt! Sie hat keinen Platz in meinem wahrhaftigen Dasein, sie unterbricht meinen Flow, sie hält die Welt vom Funktionieren ab, sie ist ein Subjekt, das es auszumerzen gilt, auf die Seite schieben, Tomaten nach ihr werfen. Ich vernehme schnauben, heftiges Stöhnen, Rita und Ich sind in Hochform, Rita und Ich wollen fokussieren, Rita-Ich. Wie ein vom Radar geblitztes Eichhörnchen dränge ich mich aus dem Coop. Etwas erschrocken über meine aufkeimende aggressive Ungeduld versuche ich mir die Worte des Krav Maga-Lehrers ins Gedächtnis zu rufen: «Du besitzt nicht wirklich eine aggressive Ader oder gar Selbstverteidigungsmechanismen, oder? Arme hoch und zuschlagen; Arme hoch und verteidigen, los!». Stimmt, stimmt, also ruhig durchatmen, ohhhhm. Yoga-Ich, Yoga-ich, Yoga-Ich. Nach einer schlaflosen Nacht schwant mir Übles ... Rita ist über Nacht geblieben und hat nicht vor, sich aus meinem Leben zu begeben. Noch drei Tage, drei Tage die Langsamkeit der Welt verfluchen, drei Tage fokussiertes Bewusstsein ohne Bewusstsein des Selbsts, drei Tage einer Leistungsnorm nachstreben, die neuronal verfälscht wird, die mein idealistisches Kern-Selbst in Frage stellt, die mich zu Rita macht. Rita: vierundzwanzig, gedopt, gelobt. Nach fünf Tagen freiwillig unfreiwilliger Selbstfremdmachung nahm Rita Abschied und ich den verdienten Schlaf in Form einer blauen Pille. Wie war das nochmals bei Matrix? Blau für Illusion, rot für Wirklichkeit. Nach fünf Tagen Daueraktivität verzichte ich liebend gerne auf die propagierte Deutlichkeit, Klarheit, Schnelligkeit meines Daseins, schlafe die Nacht durch und am nächsten Morgen wandle ich poetisch-verklärt durch die Strassen und assoziiere – Rita sagt: «Spazieren? Wieso?»

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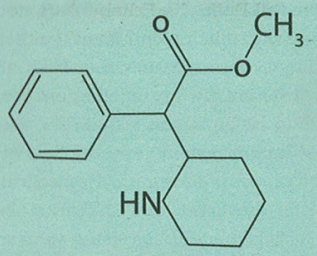


Ritalin (Methylphenidat) *wird zur Behandlung der Aufmerksamkeitsdefizit-/ Hyperaktivitätsstörung ADHS und bei Narkolepsie verwendet sowie als Aufputschmittel missbraucht, etwa zur Förderung der Leistungsfähigkeit oder als Partydroge.*

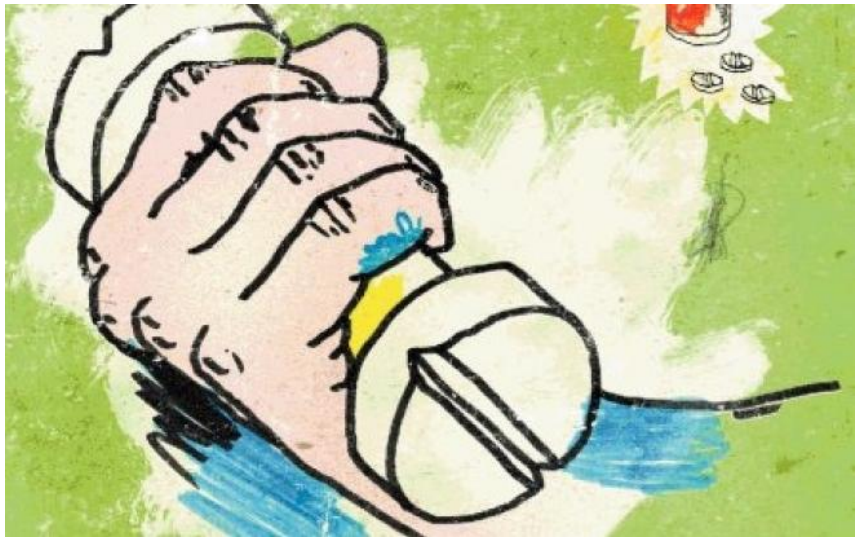
Modafinil *ist ein Wirkstoff aus der Gruppe der Stimulantien, der die Wachheit fördert und in der Schweiz zur Behandlung der Narkolepsie zugelassen ist. Weil es wach hält, wird es als Smart Drug, Dopingmittel und Partydroge missbraucht.*

Aderall *wird wie Ritalin und Modafinil bei ADHS und Narkolepsie eingesetzt und vorwiegend in Amerika als ‹study drug› zweckentfremdet, da es zur Leistungs- und Konzentrationssteigerung beiträgt.*

NZZ CAMPUS

25. Juli 2011

Hype um Ritalin



Ritalin ist bei Schweizer Studierenden weit weniger verbreitet, als bisher vielfach vermutet wurde. (Bild: Falko Ohlmer)

Der Missbrauch von Ritalin und ähnlichen Stimulanzien ist bei Studierenden weitaus geringer als bisher präsentiert. Dies zeigt die erste auf die Schweiz fokussierte Studie über den Gebrauch von leistungssteigernden Pillen.
Jessica Cunti

Auffällig ruhig ist es in den Schweizer Fachhochschulen und Universitäten. Noch einige Wochen zuvor steckten die Köpfe der Studierenden tief in Büchern, und die Augenringe waren seit Beginn des Semesters merklich ausgeprägter. Grosse Beachtung schenkte man den Müdigkeitsmerkmalen nicht, dafür war keine Zeit, denn die Prüfungen standen vor der Tür. Der Druck vor Semesterende lastet jeweils schwer auf den Studenten, und jeder hat seine eigenen Mittel, um mit dem Stress umzugehen. Einige sollen jedoch Hilfsmittel verwenden, die über

Mediation und Kaffeetrinken hinausgehen, wie man sich in den Gängen der Universität zuflüstert oder in Zeitungen liest. So titelten die Massenmedien, dass viele Studierende heimlich Ritalin und andere leistungssteigernde Mittel missbrauchten.

Meist nur einmal probiert

Nun gibt es Entwarnung. Der Missbrauch von Ritalin und anderen Stimulanzien durch Schweizer Studierende ist bei weitem nicht so gross wie vielfach angenommen. Jedenfalls nicht bei den Medizinstudierenden, die hinter vorgehaltener Hand als die grössten Pillenmissbraucher galten. Roman Kowalewski, Oberarzt an der Psychiatrischen Universitätsklinik Zürich, hatte mit einem höheren Konsum solcher Stimulanzien gerechnet und ist überrascht: Nur lediglich ein Prozent der Medizinstudenten nehmen Ritalin mindestens monatlich ein. Dies zeigt Kowalewskis Studie, in der rund die Hälfte aller Zürcher Medizinstudenten über ihren Substanzkonsum befragt wurden. Diese Untersuchung ist die erste dieser Art, die auf Schweizer Studenten ausgerichtet ist.

Gute 4,5 Prozent der Befragten haben Ritalin bereits einmal probiert. Und bei denen, die dabei geblieben sind, geschieht das effektiv in der Hoffnung, die Leistung im Studium zu verbessern. Doch die Ergebnisse zeigen, dass die Mehrheit nach einem Testlauf die Finger davon lässt. Wirken die Stimulanzien zwar bei Menschen mit der Aufmerksamkeitsstörung ADHS, sind die meisten Studierenden ohne solche Störung jedoch enttäuscht von der Wirkung.

Überspitzte Darstellung

«Bei Tests konnte keine Verbesserung der Leistung festgestellt werden», sagt Lars Stark, ärztlicher Leiter bei der Arbeitsgemeinschaft für risikoarmen Drogenkonsum. Die Leistung könne sogar zurückgehen, vor allem, wenn man kreativ tätig sei. Ernüchtert sind die Studenten meist, wenn sie die Nebenwirkungen der Medikamente am eigenen Leib erfahren. Das Herz-Kreislauf-System kann aus dem Ruder geraten, die Schweissproduktion angeregt werden und ein Zittern den Konsumenten heimsuchen, Symptome, die von aussen kaum bemerkt werden, weshalb die meisten Studenten, die Ritalin nehmen, nicht aus der Reihe tanzen.

Um den Missbrauch an den Universitäten zu dokumentieren, mussten die Medien bisher auf amerikanische Studien zurückgreifen. So kursierte für einige Zeit eine umstrittene Umfrage, die ergeben hatte, dass zwischen 16 und 25 Prozent der Collegestudenten Pillen zur Leistungsförderung schluckten. Eine weitere, diesmal jedoch repräsentative Studie führten Forscher der University of Michigan durch. Lediglich knapp 7 Prozent der 11 000 befragten Studierenden konsumierten Ritalin. Doch auch diese Studie konnte leicht zur medialen Überspitzung verwendet werden, lag die Quote an einer der untersuchten Hochschulen doch bei 25 Prozent.

«Kenne niemanden»

Regula Ott, Doktorandin am Institut für Biomedizinische Ethik an der Universität Zürich, kritisiert diese Verzerrung der Studienerkenntnisse: «Die Studien aus den USA wurden so zitiert, dass bei den Lesern ein falscher Eindruck von der Situation entsteht.» Sie selbst führt derzeit im Rahmen ihrer Doktorarbeit eine Umfrage unter Studierenden durch. Bei dieser soll nebst dem eigentlichen Konsum der leistungssteigernden Mittel auch die ethische Seite des Gebrauchs untersucht werden. Persönlich kenne sie nämlich niemanden, der die Pillen missbrauche. Genau wie 73 Prozent der Studierenden und Doktorierenden der Universität Zürich, die sie befragt hat. Obwohl die Berichterstattungen in den Schweizer Medien über die US-Studien zum

Pillenkonsum negativ waren, kann dies gegensätzliche Auswirkungen auf die Schweizer Studierenden haben. Laut Kowalewski suggerieren solche Berichte überzogene Erwartungen an die Pillen, und dies könne inspirierend wirken, solche Stimulanzien auszuprobieren.

Lars Stark von der Arbeitsgemeinschaft für risikoarmen Drogenkonsum macht den Hype um Ritalin und ähnliche Mittel für ein weiteres Problem verantwortlich. Denn obwohl ADHS mittlerweile gesellschaftlich akzeptiert ist und auch das Verschreiben der Medikamente, fühlten sich Menschen mit der Störung zunehmend stigmatisiert. Sprächen sie heutzutage offen über ihre verschriebene Ritalin-Einnahme, werfe man ihnen zusehends den Missbrauch der Medikamente zur Leistungssteigerung vor. Entweder direkt oder indirekt durch Kommentare wie «das Viagra fürs Hirn».

Wirkung nur bei Patienten

Die Verschreibung von ADHS-Medikamenten erregt derzeit auf politischer Ebene die Gemüter. So wird diskutiert, ob es notwendig sei, die Verordnungen einzuschränken. «Das Problem der Regulierung ist komplex. Ritalin ist zwar nur für ADHS zugelassen und unterliegt dem Betäubungsmittelgesetz, kann aber nach sorgfältiger Abwägung und Aufklärung auch für andere Störungen eingesetzt werden», sagt Kowalewski.

Am ehesten funktioniere der mentale Anschub noch bei denjenigen, die an einer (unbehandelten) Aufmerksamkeitsstörung leiden. Statistisch gesehen dürften unter den Befragten erheblich mehr von dieser Störung betroffen sein als tatsächlich Ritalin nehmen. Doch da die Medikamente ihre Wirkung nur bei bestimmten Patientengruppen entfalten, geht Kowalewski nicht davon aus, dass Ritalin sich in der breiten Masse festsetzt.

Stichworte
Gesundheit

Bioethik – Kombination vieler Gedankengänge

Immer mehr Universitäten in Europa bieten eine fundierte Ausbildung an

Viele moderne Technologien stellen uns heute vor neue ethische Fragen. Bioethiker mit einer Grundausbildung in einem klassischen Studiengang sollen helfen, Antworten zu finden.

Stephanie Lahrtz

Bioethik ist ganz offenbar chic. Immer mehr Universitäten im deutschsprachigen Raum, aber auch anderswo in Europa bieten in letzter Zeit strukturierte Kurse statt nur vereinzelter Vorlesungen für Biologen, Mediziner oder Juristen an. Als erste Hochschule in der Schweiz hat die Universität Zürich 2009 ein dreijähriges Programm für Doktoranden ins Leben gerufen, angesiedelt am Institut für biomedizinische Ethik. In Deutschland war die Universität Tübingen mit 1991 gestarteten Doktorandenkursen am Interdisziplinären Zentrum für Ethik in den Wissenschaften Vorreiter und zugleich viele Jahre auch Einzelkämpfer. Unsere von neuen Technologien geprägte Welt stelle die Gesellschaft eben auch vor neue ethische Fragen, die neue Qualifikationen erforderten, argumentieren die Befürworter der Bioethik-Ausbildungsgänge. Moderne Spitzenforschung und Spitzenmedizin seien heute ohne eine hochqualifizierte Ethik nicht mehr denkbar.

Vorreiter USA

Ein Blick auf die Angebote guter und vor allem sehr guter amerikanischer wie auch kanadischer Universitäten zeigt, dass Bioethik-Kurse, sei es für Bachelor-Studenten, Master-Abschlüsse oder auch als Programm für Doktoranden, dort seit vielen Jahren gang und gäbe sind. Ursachen dafür gibt es laut Experten viele. So habe der technische Fortschritt in Amerika weit früher begonnen und verlaufe oft auch schneller. Somit seien dort auch viel früher Fragen nach möglichen Problemen aufgekommen. Zudem habe man in den USA aufgrund einer liberaleren Tradition bereits in den 1970er Jahren viel über die Rechte von Patienten beispielsweise bei der Teilnahme an klinischen Studien debattiert, ergänzt Roland Kipke vom Ethikzentrum in Tübingen.

Auch seien Programme in Bioethik immer sehr interdisziplinär angelegt, erläutert Effy Vayena, Koordinatorin des PhD-Programms «Biomedical Ethics and Law» an der Universität Zürich. «Diese Interdisziplinarität hat man in den USA viel früher als in Europa an den Universitäten gepflegt, und man tut sich dort nach wie vor leichter damit.» Nun helfe dabei hierzulande auch die neue Struktur der Studiengänge gemäss dem Bologna-Prozess. Denn Kurse mit interdisziplinären Themen seien nun besser ins Studium integrierbar. Gemäss den Programmbeschreibungen von beidseits des Atlantiks umfasst Bioethik weit mehr als die landläufig damit verbundenen Fragen, ob menschliche embryonale Stammzellen von der Forschung verwendet werden dürfen oder ab wann man Organe Sterbender für Transplantationen freigeben darf. So beschäftige sich eine Doktorarbeit damit, ob es ethisch vertretbar sei, klinische Studien mit neuen Medikamenten statt in Europa in Entwicklungsländern durchzuführen, weil es dort billiger und einfacher sei, erzählt Vayena.

Interesse für mehrere Fächer

Regula Ott, eine der Zürcher Doktorandinnen, geht der Frage nach, ob es der Gesellschaft gegenüber fair sei, sogenannte Neuroenhancer, also Substanzen zur Verbesserung der Gehirnleistung, im Studium einzusetzen. Und Jürg Streuli, Assistenzarzt in der Kinder- und Jugendmedizin, erforscht am Beispiel der Intersexualität, bis zu welchem Mass Eltern und Fachpersonen grundlegende Merkmale eines Kindes bestimmen sollen und dürfen. Sowohl Streuli als auch Ott erzählen, dass sie sich schon während ihres jeweiligen Studiums beziehungsweise ihrer Arbeit im Spital immer wieder gefragt hätten, warum man etwas mache und ob es gut sei, so zu handeln. Beide wollen durch eine tiefergehende Beschäftigung mit grundlegenden Wertvorstellungen neue Denkweisen und somit auch Lösungsansätze für Fragen in der alltäglichen Arbeit erhalten.

Dieses Interesse für mehrere Fächer sowie für die Kombination philosophischer Analysen und empirischer Studien ist nicht nur in Zürich eine der Voraussetzungen für die Zulassung zum jeweiligen Programm. Mittlerweile habe man deutlich mehr Anfragen als Studienplätze, erzählt Vayena. Denn in Zürich wie auch anderswo werden in der Regel nur zwischen fünf und zehn Teilnehmer zugelassen. Dies hat zum einen mit den jeweils begrenzten Ressourcen der Ethik-Institute zu tun. Zum anderen wissen auch die Programmverantwortlichen, dass insgesamt nur wenige Fachkräfte mit umfassender Ausbildung in Bioethik benötigt werden. Erfahrungen aus den USA und Kanada zeigen, dass Doktoranden mit solchen Qualifikationen neben der Arbeit an Universitäten auch in Ethik-Komitees, in Behörden, Medien, aber auch bei Nichtregierungsorganisationen tätig sind. Doch insgesamt ist der Jobmarkt zwar vielfältig, aber überschaubar.

Kein Feigenblatt werden

Fraglich ist nun, ob Bioethik-Programme mehr als eine Modeerscheinung sind – oder ein Ausweg für Mediziner und Biologen, die sich nicht im Labor und im OP-Saal die Hände dreckig machen wollen, wie manchmal gelästert wird. Brigitte von Rechenberg, Tierärztin in der Forschung an der Universität Zürich, seit vielen Jahren Mitglied in diversen Ethik-Komitees und Präsidentin der kantonalen Tierversuchskommission gibt zu bedenken, dass fundierte Kompetenz in einem medizinischen oder biologischen Fach gerade auch in Ethik-Komitees von grosser, wenn nicht sogar von grösserer Bedeutung sei als das alleinige Nachdenken über Moral. Ethische Entscheidungen müssten letztlich auf der Grundlage von Fachwissen getroffen werden. Streuli warnt davor, dass ein überstrapazierter Ethikbegriff ohne die nötigen Kompetenzen zu einem Feigenblatt verkommen könnte und so problematische Entscheidungen eher decke als kritisch hinterfrage.

Santé

La m decine ne sert pas toujours soigner

Les traitements pour améliorer les performances ou le physique sont très demandés. Des professionnels proposent un débat

Caroline Zuercher

Destinée, à la base, aux enfants hyperactifs, la Ritaline est aussi utilisée par des adultes pour augmenter leurs capacités professionnelles. KEYSTONE/STEFFEN SCHMIDT

Une pilule pour augmenter la concentration, une opération pour réduire les rides... De la Ritaline au lifting, la tendance est au *human enhancement* - ces interventions médicales ou biotechnologiques dont le but n'est pas de traiter ou de prévenir une maladie, mais d'améliorer par exemple les performances intellectuelles ou le physique. L'Académie suisse des sciences médicales (ASSM) s'est penchée sur cette question et présente ses recommandations dans le *Bulletin des médecins suisses*.

«Depuis une dizaine d'années, il y a une nette augmentation de ces traitements», explique le vice-président de l'ASSM, Peter Suter. L'Académie souhaitait rappeler aux patients que vouloir rester jeune, beau et performant toute sa vie, ce n'est pas forcément bon pour la santé. Mais le débat s'adresse aussi aux médecins. Selon l'ASSM, 40% d'entre eux considèrent que le *enhancement* fait partie de la médecine. Cette appréciation est fondée, ajoute-t-elle, puisque les interventions à visée cosmétique, par exemple, appartiennent depuis longtemps à la médecine. Même si elles sont controversées.

La plupart de ces produits étant délivrés sur ordonnance, les médecins sont directement confrontés à la question. «Malheureusement, certains collègues appliquent des traitements ou suggèrent des médicaments qui ne sont pas nécessaires, regrette Peter Suter. Cela se passe surtout dans le domaine neurologique: des stimulants ou des calmants sont prescrits pour le confort.»

Boom sur la Ritaline

Le professeur donne l'exemple de la Ritaline. A la base, celle-ci était destinée aux enfants hyperactifs. Désormais, elle est aussi utilisée par des adultes pour augmenter leurs capacités professionnelles. Parfois trop facilement. «Les prescriptions ont tellement augmenté que nous avons mené une campagne pour rendre les médecins attentifs à cette question», conclut-il.

Plus de la moitié des médecins considèrent que leur image se dégrade quand ils s'éloignent du traitement réel des maladies. Une étude montre qu'ils font preuve de retenue, sans toutefois exclure totalement le *enhancement*. En réalité, la limite entre bien-être et soins évolue avec le temps. Et dans la pratique, elle n'est pas simple à établir. Comment réagir face à un homme qui souffre parce que son nez est de travers? «Le médecin doit l'écouter et le prendre au sérieux, répond Peter Suter. Si sa souffrance est réelle, cela peut être une indication pour un traitement ou une opération esthétique.» Pour le professeur, toutefois, la discussion permet souvent de dégager un compromis.

Une question commerciale

La question est aussi commerciale. «Le problème n'est pas tant que les firmes viennent nous vendre des médicaments, précise Peter Suter. Les patients se documentent sur Internet puis vont voir leur médecin pour demander un traitement.» Parfois, le praticien ne connaît même pas cette prescription, mais préfère la donner plutôt que d'admettre qu'il doit s'informer.

Faut-il légiférer? L'ASSM propose surtout un débat. Même si certains produits sont dangereux, Peter Suter considère que «les règles sont déjà assez strictes». Dans ces conditions, il recommande plutôt la mise en place de directives de bonne pratique médicale et d'éthique. Selon Regula Ott, doctorante à l'Institut zurichois de bioéthique médicale, les médecins ont aussi besoin que la société se prononce sur ces questions.

Parmi les pistes de réflexion, Peter Suter souligne que cette évolution coûte cher à la société. Certains traitements sont pris en charge par l'assurance maladie. Sans compter que des médecins et des soignants formés aux frais du contribuable partent travailler dans ce secteur, au sein de cliniques privées, et sont donc soustraits au système de soins.

Le remboursement des primes maladie se précise

Les cantons se sont mis d'accord sur une nouvelle proposition pour mettre fin au conflit sur les primes payées en trop

Les cantons sont désormais prêts à remonter au front pour mettre un terme au dossier des primes maladie payées en trop - quelque 2 milliards de francs depuis 1996. Comme le révélait hier soir l'émission *Forum* de la RTS, la Conférence des directeurs cantonaux de la santé a adopté une nouvelle solution, qui sera présentée le 2 mai à la Commission de la santé du Conseil des Etats.

Cette nouvelle mouture est moins généreuse que la précédente. Elle prévoit que seuls 800 millions de francs (et non 1 milliard) soient rétrocédés aux cantons qui ont payé trop de primes. Trois acteurs seraient mis à contribution: les assurés des cantons qui ont payé des primes trop basses, mais aussi les assureurs et la Confédération. Le versement se ferait en une seule fois.

Vingt cantons sur 26 appuient ce compromis, 4 se sont abstenus et seuls 2 s'y sont opposés. «Le score est très net, ce qui me réjouit. Je suis satisfait de la solution trouvée, même si elle est de plus en plus partielle. La balle est maintenant clairement dans le camp du Parlement», estime le ministre vaudois de la Santé, Pierre-Yves Maillard.

Les obstacles politiques restent encore nombreux. Interrogé par la RTS, le conseiller fédéral Alain Berset s'est montré sceptique, soulignant qu'il n'existe aucune base légale permettant à la Confédération d'intervenir. Membre de la commission, le sénateur socialiste bernois Hans Stöckli, qui s'était opposé au premier projet, est plus ouvert. «C'est une solution qui n'est pas technique, mais politique. On ne peut pas régler le problème autrement», estime-t-il.

En janvier, la décision de la Commission des Etats de classer sans suite le remboursement des primes payées en trop avait suscité une forte mobilisation. Cet élément pèsera de tout son poids lors des prochaines discussions. **J.MT**

Vaud a décidé d'expulser Bulat Chagaev

Le renvoi de l'ex-président de Neuchâtel Xamax a été entériné

Sans permis de séjour valable en Suisse, Bulat Chagaev est-il sur le point d'être expulsé? «Oui», selon une information de *20 minutes* se basant sur une lettre du Service de la population (SPOP) reçue par les autorités de Saint-Sulpice hier. «Pas si sûr», répond le conseiller d'Etat Philippe Leuba. «Tant que les procédures sont en cours, procédures qui sont longues et difficiles dans leurs applications, je ne communiquerai pas sur ce dossier. Je le ferai quand le sort de Bulat Chagaev sera défini», concède-t-il. Le syndic de Saint-Sulpice, Jean-Charles Cerottini, se montre moins évasif. «Notre Contrôle des habitants a bel et bien reçu une copie de la décision du SPOP de renvoyer M. Chagaev.» Interrogé par la RTS hier soir, le citoyen russe confirme la décision, mais assure qu'il fera recours contre celle-ci. «Ils veulent que je parte pour étouffer l'affaire de Neuchâtel Xamax», a-t-il déclaré, affirmant que d'autres étaient responsables de la situation.

Bulat Chagaev réside à Saint-Sulpice, dans une villa appartenant à son ex-femme. Après la faillite du club neuchâtelois en janvier 2012, il avait été assigné à résidence dès le mois d'avril suivant. Cette assignation, qui l'obligeait à se présenter deux fois par semaine au contrôle des habitants, avait été levée en février 2013 après le paiement d'une caution de 700 000 francs.

L'homme d'affaires a cinq jours ouvrables pour faire recours contre la décision du SPOP. Sans réaction de sa part, il aura jusqu'au 10 mai pour quitter la Suisse. **L.A.**

Bibliography

[1] Thorsten Galert et al. “Neuro-Enhancement: Das optimierte Gehirn”. German. In: *Gehirn und Geist* 11 (Oct. 2009).

[2] Cynthia Forlini and Eric Racine. “Disagreements with implications: diverging discourses on the ethics of non-medical use of methylphenidate for performance enhancement”. In: *BMC Medical Ethics* 10 (July 2009).

[3] Martin Kordt. *DAK Gesundheitsreport 2009*. German. Feb. 2009.

[4] Bradley J. Partridge et al. “Smart Drugs As Common As Coffee: Media Hype about Neuroenhancement”. In: *PLoS ONE* 6.11 (Nov. 2011).

[5] Henry Greely et al. “Towards responsible use of cognitive-enhancing drugs by the healthy”. In: *Nature* 456.7223 (Dec. 2008), pp. 702–705.

[6] Reinoud de Jongh et al. “Botox for the brain: enhancement of cognition, mood and pro-social behavior and blunting of unwanted memories”. In: *Neuroscience & Biobehavioral Reviews* 32 (2008), pp. 760–776.

[7] *Web of Knowledge*. apps.webofknowledge.com. Accessed: 18. Sept. 2013.

[8] Hans Förstl. “Neuro-Enhancement”. German. In: *Der Nervenarzt* 80.7 (July 2009), pp. 840–846.

[9] Klaus Lieb. *Hirndoping: warum wir nicht alles schlucken solllten*. German. Mannheim: Artemis & Winkler, 2010.

[10] Barbara Sahakian and Sharon Morein-Zamir. “Professor’s little helper”. In: *Nature* 450.7173 (Dec. 2007), pp. 1157–1159.

[11] Birgit Schmid. ”Selbstversuch mit Ritalin: 10 Milligramm Arbeitswut”. German. In: *Tagesanzeiger: Das Magazin*. (14. Aug. 2009).

[12] Margaret Talbot. ”Brain Gain”. In: *The New Yorker*. (27. April 2009).

[13] Maia Szalavitz. ”Popping Smart Pills: The Case for Cognitive Enhancement”. In: *Time*. (6. Jan. 2009).

[14] Ulrich Bahnsen. “Die Denkpille”. German. In: *NZZ Folio* (Nov. 2010).

[15] David Ewing Duncan. ”How Science Can Build a Better You”. In: *The New York Times*. (3. Nov. 2012).

[16] Dimitris Repantis, Oona Laisney, and Isabella Heuser. “Acetylcholinesterase inhibitors and memantine for neuroenhancement in healthy individuals: A systematic review”. In: *Pharmacological Research* 61.6 (June 2010), pp. 473–481.

[17] Simon M. Outram. “The use of methylphenidate among students: the future of enhancement?” In: *Journal of Medical Ethics* 36.4 (Apr. 2010), pp. 198–202.

[18] Martin Dresler et al. “Non-pharmacological cognitive enhancement”. In: *Neuropharmacology* 64 (Jan. 2013), pp. 529–543.

[19] Irena Ilieva, Joseph Boland, and Martha J. Farah. “Objective and subjective cognitive enhancing effects of mixed amphetamine salts in healthy people”. In: *Neuropharmacology* 64 (Jan. 2013), pp. 496–505.

[20] Andreas G. Franke and Klaus Lieb. “Pharmakologisches Neuroenhancement und Hirndoping”. German. In: *Bundesgesundheitsblatt - Gesundheitsforschung - Gesundheitsschutz* 53.8 (Aug. 2010), pp. 853–860.

[21] Anne Eckhardt et al. *Human Enhancement*. German. Vol. 56. TA-Swiss. Zürich: vdf Hochschulverlag AG an der ETH Zürich, 2011.

[22] Irena P. Ilieva and Martha J. Farah. “Enhancement stimulants: perceived motivational and cognitive advantages”. In: *Frontiers in Neuroscience* 7 (2013).

[23] René Kühne and Roland Rapold. “Nicht alarmierend - Fragen stellen sich dennoch”. German. In: *Bulletin des médecins suisses| Schweizerische Ä rztezeitung| Bollettino dei medici svizzeri* 92 (2011), p. 34.

[24] U.S. Food and Drug Administration. Sept 2008. *Pharmaceutical Company Cephalon to Pay $425 Million for Off-label Drug Marketing*. www.fda.gov/ICECI/CriminalInvestigations/ucm260715.htm. Accessed: 18. Sept. 2013.

[25] Brendan Maher. “Poll results: look who’s doping”. In: *Nature* 452.7188 (Apr. 2008), pp. 674–675.

[26] Roberto Esposito et al. “Acute Effects of Modafinil on Brain Resting State Networks in Young Healthy Subjects”. In: *PLoS ONE* 8.7 (July 2013).

[27] Michael J. Minzenberg and Cameron S. Carter. “Modafinil: A Review of Neurochemical Actions and Effects on Cognition”. In: *Neuropsychopharmacology* 33.7 (2008), pp. 1477–1502.

[28] Ian Sample. “Wired awake”. In: *the Guardian* (July 2009).

[29] Andreas Heinz et al. “Cognitive neuroenhancement: false assumptions in the ethical debate”. In: *Journal of Medical Ethics* 38.6 (June 2012), pp. 372–375.

[30] Dimitris Repantis et al. “Antidepressants for neuroenhancement in healthy individuals: a systematic review”. In: *Poiesis & Praxis* 6.3-4 (Nov. 2008), pp. 139–174.

[31] Tom M McLellan and Harris R Lieberman. “Do energy drinks contain active components other than caffeine?” In: *Nutrition Reviews* 70.12 (2012), 730744.

[32] Andrew Scholey and Lauren Owen. “Effects of chocolate on cognitive function and mood: a systematic review”. In: *Nutrition reviews* 71.10 (2013), 665681.

[33] P. Walden. “100 Jahre Benzol”. German. In: *Angewandte Chemie* 39.5 (1926), 125132.

[34] Aryeh I Herman and Mehmet Sofuoglu. “Cognitive effects of nicotine: genetic moderators”. In: *Addiction biology* 15.3 (July 2010), pp. 250–265.

[35] Peter Sedlmeier et al. “The psychological effects of meditation: A meta-analysis”. In: *Psychological Bulletin* 138.6 (2012), pp. 1139–1171.

[36] *Arzneimittel-Kompendium der Schweiz*. http://compendium.ch/. Accessed: 20. Sept. 2013.

[37] George A. Gates et al. “Effect of beta blockade on singing performance”. In: *The Annals of otology, rhinology, and laryngology* 94.6 Pt 1 (Dec. 1985), pp. 570–574.

[38] Walter Glannon. “Psychopharmacology and memory”. In: *Journal of Medical Ethics* 32.2 (Feb. 2006), pp. 74–78.

[39] Andreas G Franke et al. “The use of Ginkgo biloba in healthy elderly”. In: *Age (Dordrecht, Netherlands)* (June 2013).

[40] Chris Alford, Jennifer Hamilton-Morris, and Joris C. Verster. “The effects of energy drink in combination with alcohol on performance and subjective awareness”. In: *Psychopharmacology* 222.3 (Aug. 2012), pp. 519–532.

[41] Martha J. Farah et al. “When we enhance cognition with Adderall, do we sacrifice creativity? A preliminary study”. In: *Psychopharmacology* 202.1-3 (Jan. 2009), pp. 541–547.

[42] Indu Taneja et al. “A Randomized, Double-Blind, Crossover Trial of Modafinil on Mood:” in: *Journal of Clinical Psychopharmacology* 27.1 (Feb. 2007), pp. 76–78.

[43] Pascal Borry, Paul Schotsmans, and Kris Dierickx. “What is the role of empirical research in bioethical reflection and decision-making? An ethical analysis”. In: *Medicine, health care, and philosophy* 7.1 (2004), pp. 41–53.

[44] Daniel C Maguire. “Death by chance, death by choice”. In: *Atlantic monthly (Boston, Mass.: 1971)* 233.1 (Jan. 1974), pp. 56–65.

[45] Rob De Vries and Bert Gordijn. “Empirical ethics and its allleged meta-ethical fallacies”. In: *Bioethics* 23.4 (May 2009), pp. 193–201.

[46] Christoph Rehmann-Sutter, Rouven Porz, and Jackie Leach Scully. “How to Relate the Empirical to the Normative”. In: *Cambridge Quarterly of Healthcare Ethics* 21.04 (2012), pp. 436–447.

[47] Jackie Leach Scully. *Disability Bioethics: Moral Bodies, Moral Difference*. Rowman & Littlefield, 2008.

[48] Margaret Urban Walker. *Moral Understandings: A Feminist Study in Ethics*. Oxford University Press, Sept. 2007.

[49] Martha J. Farah et al. “Neurocognitive enhancement: what can we do and what should we do?” In: *Nature Reviews Neuroscience* 5.5 (May 2004), pp. 421–425.

[50] Thomas Douglas. “Human enhancement and supra-personal moral status”. In: *Philosophical Studies* 162.3 (Feb. 2013), pp. 473–497.

[51] Frances M. Kamm. “Is There a Problem With Enhancement?” In: *The American Journal of Bioethics* 5.3 (2005), pp. 5–14.

[52] Margaret Olivia Little. “Cosmetic surgery, suspect norms, and the ethics of complicity”. In: *Enhancing human traits: ethical and social implications*. Washington, D.C.: Georgetown University Press, (1998), 162176.

[53] Maartje Schermer et al. “The Future of Psychopharmacological Enhancements: Expectations and Policies”. In: *Neuroethics* 2.2 (Feb. 2009), pp. 75–87.

[54] Julian Savulescu. “New breeds of humans: the moral obligation to enhance”. In: *Reproductive BioMedicine Online* 10, Supplement 1 (2005), pp. 36–39.

[55] John Harris. *Enhancing evolution the ethical case for making better people*. Princeton, NJ: Princeton University Press, 2007.

[56] Francis Fukuyama. *Our posthuman future: consequences of the biotechnology revolution*. New York: Picador, 2002.

[57] Michael J Sandel. *The case against perfection: ethics in the age of genetic engineering*. Cambridge, Mass.: Belknap Press of Harvard University Press, 2007.

[58] Sean Esteban McCabe et al. “Non-medical use of prescription stimulants among US college students: prevalence and correlates from a national survey”. In: *Addiction* 100.1 (2005), pp. 96–106.

[59] Christian J. Teter et al. “Illicit Use of Specific Prescription Stimulants Among College Students: Prevalence, Motives, and Routes of Administration”. In: *Pharmacotherapy* 26.10 (Oct. 2006), pp. 1501–1510.

[60] Timothy E. Wilens et al. “Misuse and Diversion of Stimulants Prescribed for ADHD: A Systematic Review of the Literature”. In: *Journal of the American Academy of Child & Adolescent Psychiatry* 47.1 (Jan. 2008), pp. 21–31.

[61] Andreas G Franke et al. “Non-medical use of prescription stimulants and illicit use of stimulants for cognitive enhancement in pupils and students in Germany”. In: *Pharmacopsychiatry* 44.2 (Mar. 2011), pp. 60–66.

[62] Sebastian Sattler et al. “The Rationale for Consuming Cognitive Enhancement Drugs in University Students and Teachers”. In: *PLoS ONE* 8.7 (July 2013), e68821.

[63] Elke Middendorff, Jonas Poskowsky, and Wolfgang Isserstedt. *Formen der Stresskompensation und Leistungssteigerung bei Studierenden. HISBUS-Befragung zur Verbreitung und zu Mustern von Hirndoping und Medikamentenmissbrauch*. German. Tech. rep. Hannover: HIS: Forum Hochschule, Jan. 2012.

[64] Patrick Eickenhorst et al. “Neuroenhancement among German university students: motives, expectations, and relationship with psychoactive lifestyle drugs”. In: *Journal of psychoactive drugs* 44.5 (Dec. 2012), pp. 418–427.

[65] Stefanie Mache et al. “Cognitive-enhancing substance use at German universities: frequency, reasons and gender dif es”. In: *Wiener medizinische Wochenschrift (1946)* 162.11-12 (June 2012), pp. 262–271.

[66] Pavel Dietz et al. “Randomized Response Estimates for the 12-Month Prevalence of Cognitive-Enhancing Drug Use in University Students”. In: *Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy* 33.1 (2013), 4450.

[67] Robyn M. Emanuel et al. “Cognitive Enhancement Drug Use Among Future Physicians: Findings from a Multi-Institutional Census of Medical Students”. In: *Journal of General Internal Medicine* 28.8 (Aug. 2013), pp. 1028–1034.

[68] Guilherme Finger, Emerson Rodrigues da Silva, and Asdrubal Falavigna. “Use of methylphenidate among medical students: a systematic review”. In: *Revista da Associao Médica Brasileira* 59.3 (May 2013), pp. 285–289.

[69] Jason Riis, Joseph P. Simmons, and Geoffrey P. Goodwin. *Preferences for Psychological Enhancements: The Reluctance to Enhance Fundamental Traits*. Tech. rep. Rochester, NY: Social Science Research Network, Aug. 2007.

[70] BBC. “Do cognitive-enhancing drugs work?” In: *BBC* (Nov. 2011). www.bbc.co.uk/news/health-15600900. Accessed: 9. Sep. 2013.

[71] Patrick Butler, Alexandra Topping, and Sarah Boseley. “Truth about young people and drugs revealed in Guardian survey”. In: *The Guardian* (Mar. 2012).

[72] Ferenc Biedermann. *Die Haltung der deutschschweizer Bevölkerung zum pharmazeutischen cognitive Enhancement*. German. Dissertation. Universität Basel, Schweiz, 2011.

[73] Vladimir Mijatovic. “Sündenpfuhl oder Taufbecken?” German. In: *Prisma Online* 334 (2011), pp. 39–40.

[74] Larissa J. Maier et al. “To Dope or Not to Dope: Neuroenhancement with Prescription Drugs and Drugs of Abuse among Swiss University Students”. In: *PLoS ONE* 8.11 (Nov. 2013), e77967.

[75] Michael P. Schaub and Larissa J. Maier. *Doping am Arbeitsplatz und in der Bildung in der Schweiz*. German. Tech. rep. http://www.suva.ch/management_summary_doping_am_arbeitsplatz_20121023.pdf. Accessed: 2. Dec 2013.

[76] Brad Partridge et al. “Australian university students’ attitudes towards the use of prescription stimulants as cognitive enhancers: Perceived patterns of use, efficacy and safety: Attitudes towards cognitive enhancement”. In: *Drug and Alcohol Review* 32.4 (May 2013), pp. 295–302.

[77] Scott Vrecko. “Just How Cognitive Is Cognitive Enhancement? On the Significance of Emotions in University Students Experiences with Study Drugs”. In: *AJOB Neuroscience* 4.1 (2013), pp. 4–12.

[78] Cynthia Forlini et al. “How Research on Stakeholder Perspectives Can Inform Policy on Cognitive Enhancement”. In: *The American Journal of Bioethics* 13.7 (2013), pp. 41–43.

[79] Ross D. Aikins. “Academic Performance Enhancement: A Qualitative Study of the Perceptions and Habits of Prescription StimulantUsing College Students”. In: *Journal of College Student Development* 52.5 (2011), pp. 560–576.

[80] Alan D. DeSantis and Audrey Curtis Hane. “’Adderall is definitely not a drug’: justifications for the illegal use of ADHD stimulants”. In: *Substance use & misuse* 45.1-2 (2010), pp. 31–46.

[81] John B. Bossaer et al. “The Use and Misuse of Prescription Stimulants as Cognitive Enhancers by Students at One Academic Health Sciences Center:” in: *Academic Medicine* 88.7 (July 2013), pp. 967–971.

[82] Jadon R. Webb, Mark A. Valasek, and Carol S. North. “Prevalence of stimulant use in a sample of US medical students”. In: *Annals of clinical psychiatry: official journal of the American Academy of Clinical Psychiatrists* 25.1 (Feb. 2013), pp. 27–32.

[83] Silvana Castaldi et al. “Use of Cognitive Enhancement Medication Among Northern Italian University Students”. In: *Journal of Addiction Medicine* 6.2 (June 2012), pp. 112–117.

[84] Alexander L. Peterkin et al. “Cognitive Performance Enhancement: Misuse or Self-Treatment?” In: *Journal of Attention Disorders* 15.4 (May 2011), pp. 263–268.

[85] Amanda D. McNiel et al. “The Nonmedical Use of Prescription Stimulants Among Dental and Dental Hygiene Students”. In: *Journal of Dental Education* 75.3 (Mar. 2011), pp. 365–376.

[86] Lawrence Herman et al. “The use of prescription stimulants to enhance academic performance among college students in health care programs”. In: *The journal of physician assistant education: the official journal of the Physician Assistant Education Association* 22.4 (2011), pp. 15–22.

[87] David L. Rabiner et al. “The Misuse and Diversion of Prescribed ADHD Medications by College Students”. In: *Journal of Attention Disorders* 13.2 (Sept. 2009), pp. 144–153.

[88] Marc Hoeglinger, Ben Jann, and Andreas Diekmann. ”Sensitive Questions in Online Surveys: An Experimental Comparison of the RRT and the Crosswise Model”. In: *(forthcoming).*

[89] Jun-Wu Yu, Guo-Liang Tian, and Man-Lai Tang. “Two new models for survey sampling with sensitive characteristic: design and analysis”. In: *Metrika* 67.3 (Apr. 2008), pp. 251–263.

[90] Sean Esteban McCabe et al. “Comparison of Web and mail surveys for studying secondary consequences associated with substance use: Evidence for minimal mode effects”. In: *Addictive Behaviors* 31.1 (Jan. 2006), pp. 162–168.

[91] Lena Strand Bergström and Niels Lynöe. “Enhancing concentration, mood and memory in healthy individuals: an empirical study of attitudes among general practitioners and the general population”. In: *Scandinavian journal of public health* 36.5 (July 2008), pp. 532–537.

[92] Opeyemi C. Banjo, Roland Nadler, and Peter B. Reiner. “Physician Attitudes towards Pharmacological Cognitive Enhancement: Safety Concerns Are Paramount”. In: *PLoS ONE* 5.12 (Dec. 2010), e14322.

[93] Timothy D. Hotze et al. “Doctor, Would You Prescribe a Pill to Help Me...? A National Survey of Physicians on Using Medicine for Human Enhancement”. In: *The American Journal of Bioethics* 11.1 (Jan. 2011), pp. 3–13.

[94] Andreas G. Franke et al. “Attitudes towards prescribing cognitive enhancers among primary care physicians in Germany”. In: *BMC Family Practice* 15.1 (Jan. 2014), p. 3.

[95] Eva C. A. Asscher, Ineke Bolt, and Maartje Schermer. “Wish-fulfilling medicine in practice: a qualitative study of physician arguments”. In: *Journal of Medical Ethics* 38.6 (June 2012), pp. 327–331.

[96] Andreas G. Franke et al. “Use of illicit and prescription drugs for cognitive or mood enhancement among surgeons”. In: *BMC medicine* 11.1 (Apr. 2013), p. 102.

[97] Koen Ponnet et al. “Determinants of physicians’ prescribing behaviour of methylphenidate for cognitive enhancement”. In: *Psychology, health & medicine* (May 2013).

[98] Simone J. Timmer and Gerrit Glas. “[Pills for the Psyche. Neuro-enhancement among psychiatrists, trainees and other doctors in the Netherlands – an explanatory study]”. Dutch. In: *Tijdschrift voor psychiatrie* 54.4 (2012), pp. 371–376.

[99] Caroline Koch. ”Ritalin ist grosses Kino: Verkäufe von Stimulanzien wie Ritalin haben sich in den letzten zehn Jahren versiebenfacht”. German. In: *Neue Zürcher Zeitung*. (5. Dec 2010).

[100] pbe/sda. ”Experten warnen vor gefährlichem Hirndoping”. German. In: *The New Yorker*. (24 May 2011).

[101] JSK. ”Psychopharmaka als Alltagsdoping”. German. In: *20 Minuten*. (19. June 2012).

[102] Barbara Reye. ”Die Liste der möglichen Stoffe ist lang”. German. In: *Tages-Anzeiger*. (9. Feb. 2013).

[103] Christa Berger. *Pharmakologisches Neuro-Enhancement. Auslegeordnung für die Suchtprävention.* German. Tech. rep. Suchtpräventionstelle Stadt Zürich, 2011, p. 32.

[104] *SAMW.* http://www.samw.ch/de/Ethik/Human-Enhancement.html. Accessed: 9. Oct. 13.

[105] Akademien der Wissenschaften Schweiz. *Medizin für Gesunde? Analysen und Empfehlungen zum Umgang mit Human Enhancement.* German. Köniz, 2012.

[106] NEK-CNE. "ber die Verbesserung des Menschen mit pharmakologischen Wirkstoffen". German. In: *Schweizerische Ärztezeitung* 43 (2011).

[107] *swissmedic - Schweizerisches Heilmittelinstitut - Stoffliste.* www.swissmedic.ch/daten/00080/00256/. Accessed: 13. Sept. 2013.

[108] European Alliance for Access to Safe Medicines. 2008. *The Counterfeiting Superhighway.* www.eaasm.eu/cache/downloads/dqqt3sge9hwssgcgcos440g40/455_EAASM_counterfeiting%20report_020608(1).pdf. Accessed: 13. Sept. 2013.

[109] European Alliance for Access to Safe Medicines. 2012. *Counterfeiting the Counterfeiter.* www.eaasm.eu/cache/downloads/av3r9l87z4wg4ocs8w84gogs0/CtC%20report%202012.pdf. Accessed: 13. Sept. 2013.

[110] Andy P. Field. *Discovering statistics using SPSS.* London: SAGE, 2009.

[111] *Duden online.* German. www.duden.de. Accessed: 6. Nov. 2013.

[112] *Oxford Dictionaries.* http://www.oxforddictionaries.com. Accessed: 6. Nov. 2013.

[113] Allen E. Buchanan. *Beyond humanity? The ethics of biomedical enhancement.* English. Oxford: Oxford Univ. Press, 2013.

[114] Ulrich Bröckling. *Das unternehmerische Selbst: Soziologie einer Subjektivierungsform.* German. Frankfurt am Main: Suhrkamp, 2007.

[115] Fritz Allhoff et al. "Ethics of human enhancement: 25 Questions & answers". In: *Studies in Ethics, Law, and Technology* 4.1 (2010), pp. 1–39.

[116] Julian Savulescu, Ruud ter Meulen, and Guy Kahane. *Enhancing human capacities.* Chichester, West Sussex, UK: Wiley-Blackwell, 2011.

[117] Barbara J. Sahakian and Sharon Morein-Zamir. "Neuroethical issues in cognitive enhancement". In: *Journal of Psychopharmacology* 25.2 (Feb. 2011), pp. 197–204.

[118] José López and John Scott. *Social structure.* Open University Press, 2000.

[119] *Oxford Reference, Oxford Dictionary of Sociology.* http://www.oxfordreference.com/view/10.1093/acref/ 9780199533008.001. 0001/acref-9780199533008. Accessed: 6. Nov. 2013.

[120] Stefan Svallfors. "Policy feedback, generational replacement, and attitudes to state intervention: Eastern and Western Germany, 19902006". In: *European Political Science Review* 2.01 (Feb. 2010), p. 119.

[121] The Academy of Medical Sciences. *Human enhancement and the future of work*. Report from a joint workshop hosted by the Academy of Medical Sciences, the British Academy, the Royal Academy of Engineering and the Royal Society, Nov. 2012.

[122] Dieter Birnbacher. *Natürlichkeit*. German. Walter de Gruyter, 2006.

[123] Clare Bambra. *Work, Worklessness, and the Political Economy of Health*. Oxford University Press, Oct. 2011.

[124] Chris Tilly and Charles Tilly. *Work under capitalism*. Colorado, USA: Westview Press, 1998.

[125] *Oxford Reference, A Dictionary of Media and Communication*. http://www.oxfordreference.com/view/10.1093/acref/9780199568758.001.0001/acref-9780199568758. Accessed: 7. Nov. 2013.

[126] Paula-Irene Villa. "Künstliche Körper in der Kritik. Von den Ambivalenzen der Körperarbeit in der Gegenwart." German. In: *Nach Feierabend 2012 – Gesundheit*. Ed. by David Gugerli et al. Zürich: diaphanes, (2012), pp. 127–140.

[127] Peter Miller and Nikolas Rose. "Governing economic life". In: *Economy and Society* 19.1 (Feb. 1990), pp. 1–31.

[128] Grit Höppner and Sigrid Schmitz. "Erfolgreich optimiert? Das neuropharmakologische Optimierungsparadigma und dessen geschlechtliche Implikationen". German. In: *GENDER Zeitschrift für Geschlecht, Kultur und Gesellschaft* 5.1 (Mar. 2013).

[129] Nina Degele and Sigrid Schmitz. "Kapitalismuskompatible Körper. Zum wechselseitigen 'Enhancement' gesellschaftstheoretischer und naturwissenschaftlicher Körperdiskurse". German. In: *Globale Rekonfigurationen von Arbeit und Kommunikation (Festschrift zum 60. Geburtstag von Hermann Schwengel)*. Konstanz: UVK-Verl.-Ges., (2009), pp. 115–119.

[130] WHO - Quality of Life. http://www.who.int/substance_abuse/research_tools/whoqolbref/en/. Accessed: 8. Nov. 2013.

[131] Zygmunt Bauman. "Utopia with no Topos". In: *History of the Human Sciences* 16.1 (Feb. 2003), pp. 11–25.

[132] Regula Ott and Nikola Biller-Andorno. "Neuroenhancement among Swiss Students - A Comparison of Users and Non-Users". In: *Pharmacopsychiatry* (Nov. 2013).

[133] John Rawls. *Eine Theorie der Gerechtigkeit*. German. Frankfurt am Main: Suhrkamp, 1979.

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Curriculum Vitae

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10/2003 - 09/2006	Bachelor of Science in Biology, University of Zurich
08/1998 - 08/2003	High school 'Kantonsschule Küsnacht — Musisches Profil'

Further Education

09/2013	How to Communicate Science to the Public, UZH (2 days)
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Voluntary Engagement

Since 03/2010	Queeramnesty, Amnesty International, Switzerland Co-Coordination of 'Focus Refugees' Support of asylum seekers in Switzerland
Since 04/2013	Information booklet about LGBT asylum seekers Project leader (Project fund of Amnesty Switzerland: 9000.- sFr.)
Since 11/2011	Speaker at podium discussions about LGBT asylum seekers

01/2008 - 04/2008	Conception and production of movie "s'Studiläbe a dä MNF" for the anniversary of 175 years UZH
04/2006 - 12/2007	Students representative in the faculty meetings of the faculty of science, UZH
01/2002 - 07/2003	Member of the student organization at high school

Work Experiences

09/2009 - 02/2010	Social Neurosciences, UZH Internship followed by temporary research assistance Assistance in accomplishment and analysis of fMRI-Study
02/2009 - 06/2009	nature conservancy 'Neeracherried' Internship in public relation and group tours, installation and support of exhibition
10/2008 - 12/2008	Investment Ethics Research & Advisory AG, Zurich Internship followed by temporary position as an ethics analyst Writing of ethics and sustainability reports of companies
04/2004 - 03/2008	Hotel Sedartis, Thalwil Temporary staff for banquet

Teaching Experiences

11/2011, 12 & 13	Lecture on 'Basic knowledge on Ethics in Medicine for Human Medicine and Dentistry' (German). Bachelor students, Medicine. UZH. (6 x 3 hours).
08/2013	Lecture and journal club on Ethics in Biology. International Biology Undergraduate Summer School 2013. UZH. (2 x 1 hour).
04 & 07/2013	Lecturer and co-organizer: Neuroethics Spring and Summer School. Ph.D. students. UZH. (2 weeks). Poster about teaching experiences was presented at the International Neuroethics Society annual meeting 2013 in San Diego, USA.

Activities

Sport (Soccer, cycling, squash), playing the recorder (single, trio and ensembles including concerts), drums.

Languages

German (native), English (fluent), French (conversational)

Software Skills

Microsoft Office, SPSS (statistics- and analysis-program), LaTeX (typesetting program)

Publications

Peer-reviewed Journal Articles

- Regula Ott, Nikola Biller-Andorno (2014). Neuroenhancement among Swiss students - a comparison of users and nonusers. Pharmacopsychiatry. 47(1):22-8. Epub 2013 Nov 12.
- Regula Ott, Christian Lenk, Nicole Miller, Rachel Neuhaus Bühler, Nikola Biller-Andorno (2012). Neuroenhancement - perspectives of Swiss psychiatrists and general practitioners. Swiss Med Wkly. 142: w13707.
- Vera Niederkofler, Thomas Baeriswyl, Regula Ott, Esther T. Stoeckli (2010). Nectin-like molecules/SynCAMs Are Required for Post-crossing Commissural Axon Guidance. Development 137(3): 427-435.

Non Peer-reviewed Articles and Book Chapters

- Regula Ott, Felix Kraus, Jürg Streuli (2013). Cognitive Enhancement – A story of performance, speed and greed. In: Johann Roduit, Vincent Menuz. Neohumanitas: Writing the future together. Electronical book (forthcoming).
- Regula Ott (2013). Einstellungen und Umgang von ÄrztInnen mit Neuro-Enhancement. Suchtmagazin. 3; p. 25-27. (German)
- Regula Ott, Nikola Biller-Andorno (2013). Die Bedeutung des Neuroenhancements in der ärztlichen Praxis. SÄZ Schweizerische Ärztezeitung. 94: 13/14; p. 504-506. (German)
- Regula Ott, Nikola Biller-Andorno (2012). Braindoping im Alltag. Bulletin SAGW. 3; p. 50 and front page. (German)
- Regula Ott, Nikola Biller-Andorno (2012). Anwendungskontext Neuroenhancement. Heinz Gutscher. Medizin für Gesunde? Analysen und Empfehlungen zum Umgang mit Human Enhancement. Bern, p. 44-56. ISBN 978-3-905870-29-9. (German)

Newspapers (Cited, Interview)

- Caroline Zuercher (2013). La médecine ne sert pas toujours à soigner. Tribune de Genève. 19. April. (French)
- Barbara Reye (2013). Small Talk. Die Liste der möglichen Stoffe ist lang. Interview mit Regula Ott. Tages-Anzeiger. 9. February. Wissen: p. 42. (German)
- Stephanie Lahrtz (2011). Bioethik Kombination vieler Gedankengänge. Neue Zürcher Zeitung, NZZ Campus, quarterly magazine. 5. Dezember; p. 43 (German).
- Jessica Cunti (2011). Hype um Ritalin. Neue Zürcher Zeitung, NZZ Campus, online. 25. July. (German)
- Deborah Nobs, Andreas Schönenberger (2011). Superbrain me!-Der Doktor hilft beim Studium. Gezetera. Studierendenzeitung der Universität Basel. 3; p. 6-8. (German)

Attendance at Workshops and Conferences

- Workshop: Social Gradients in Health: Empirical, Normative & Policy Perspectives. 25. May 2013. Zurich, Switzerland.
- PEALS Spring Symposium. Privileged Embodiments: Securing and Resisting the 'Valuable' Body. 21. - 22. March 2013. Newcastle, United Kingdom.
- 2nd Workshop on Neuroenhancement and Ethics. 1. - 2. February 2013. Bochum, Germany.
- Tagung: 'Ethisch konsumieren'. 19. October 2012. Zurich, Switzerland.
- Feminist Approach to Bioethics Congress (FAB) & 11th World Congress of Bioethics. 24. - 29. July 2012. Rotterdam, The Netherland.
- Fleeing Homophobia Conference. 5. - 6. September 2011. VU University Amsterdam, The Netherland.
- 25th European Conference of Philosophy of Medicine and Health Care (ESPMH). 17.-20. August 2011. Zurich, Switzerland.
- The Brocher-Hastings Center Summer Academy 2011. Human Enhancement: Medical, Ethical and Legal Implications. 4.-8. July 2011. Geneva, Switzerland.
- Symposium 'Human Enhancement und Prävention'. 10. December 2010. Bern, Switzerland.
- Einführung in die Medizinethik. Advents-Workshop der Akademie für Ethik in der Medizin. 26. - 28. November 2010. Göttingen, Germany.

Oral Presentations (Selection)

- Regula Ott. Social norms and cognitive neuro-enhancement. Interdisciplinary research colloquium in Gender Studies, UZH (German). 19. December 2012. Zurich, Switzerland.
- Caroline Clarinval, Regula Ott. Ethische Fallanalysen. HeGeBe (Heroinabgabestelle Baar). 28. August 2012. Baar, Switzerland.
- Regula Ott. Schlauer, schneller, besser - Neuro-Enhancement in der Schweiz. Apothekersymposium. 22. April 2012. Bern, Switzerland.
- Regula Ott. Who's using enhancers anyway? Results of two empirical studies among Swiss physicians and students. ESPMH conference. 17.-20. August 2011. Zurich, Switzerland.
- Regula Ott. Umfrage zum Gebrauch von leistungssteigernden Produkten bei Studierenden der UZH. Arbeitsgruppe Human Enhancement, SAMW. 10. December 2010. Bern, Switzerland.